

MINUTES OF THE IEEE/PES

TRANSFORMERS COMMITTEE

OCTOBER 15, 1986

PITTSBURGH, PA.

MEMBERS OR REPRESENTATIVES PRESENT (66)

D. J. Allan
B. F. Allen
 R. Allustiarti
S. J. Antalis
E. H. Arjeski
J. C. Arnold
J. J. Bergeron
J. D. Borst
G. H. Bowers
O. R. Compton
 J. Corkran
D. H. Douglas
J. D. Douglass
J. C. Dutton
E. C. Edwards
H. G. Fischer
 M. Frydman
R. L. Grubb
J. H. Harlow
F. W. Heinrichs
W. R. Henning
K. R. Highton
P. J. Hoefler
R. H. Hollister
C. C. Honey
 F. Huber
G. W. Iliff
R. G. Jacobsen
A. J. Jonnatti
C. P. Kappeler
W. N. Kennedy
 E. Koenig
H. F. Light
T. G. Lipscomb
R. I. Lowe
M. L. Manning
J. W. Mathews
R. E. Minkwitz
R. J. Musil

W. H. Mutschler
L. S. McCormick
J. W. McGill
C. J. McMillen
W. J. McNutt
E. T. Norton
B. K. Patel
H. A. Pearce
D. D. Perco
 (represented by P. Birke)
C. A. Robbins
L. J. Savio
 V. Shenoy
 (represented by V. Cepon)
W. W. Stein
L. R. Stensland
R. B. Stetson
E. G. Strangas
A. L. Tanton
 V. Thenappan
R. C. Thomas
D. E. Truax
R. E. Uptegraff
R. A. Veitch
L. B. Wagenaar
W. E. Wrenn
A. C. Wurdack
D. A. Yannucci
E. J. Yasuda
 (represented by F. E. Elliott)

MEMBERS ABSENT (36)

R. J. Alton	J. J. Kelly
R. Bancroft	A. D. Kline
J. V. Bonucchi	J. G. Lackey
D. J. Cash	W. Lampe
E. Chitwood	R. Little
F. W. Cook, Sr.	S. P. Mehta
D. W. Crofts	C. K. Miller
M. G. Daniels	C. Millian
J. A. Ebert	H. R. Moore
R. L. Ensign	B. E. Smith
C. G. Evans	F. W. Thomason
P. P. Falkowski	J. A. Thompson
H. E. Gabel, Jr.	T. P. Traub
D. A. Gillies	G. Vaillancourt
G. Gunnels, Jr.	J. W. Walton
G. Hall	R. J. Whearty
T. K. Hawkins	A. Wilks
C. Hurty	
O. Keller	

GUESTS (54)

J. Antweiler
D. A. Barnard
D. Basel
W. B. Binder
J. D. Blackmer
W. Boettger
C. V. Brown
G. Bryant
J. N. Davis
D. J. Fallon
J. Fleeman
M. A. Franchek
R. H. Frazer
R. Garcia
F. Gryszkiewicz
C. Hoesel
E. Howells
J. Hupp
P. Iijima
H. Johnson
E. W. Kalkstein
S. P. Kennedy
G. Klein
J. L. Koepfinger
S. Lantagne
T. Lazarz
R. E. Lee

S. Lindgren
K. R. Linsley
J. L. Moon
C. L. Moore
S. Moore
F. J. McCann
M. I. Mitelman
S. K. Oklu
W. Patterson
J. Pollitt
R. L. Provost
G. J. Reitter
W. Saxon
G. Schaufler
W. Seitlingen
T. Shkordoff
H. D. Short
P. Singh
S. D. Smith
D. Sundin
L. Swenson
D. S. Takach
T. L. Walters
H. B. Walther
H. Windisch
F. N. Young
C. S. Yung

1. CHAIRMAN'S REMARKS AND ANNOUNCEMENTS:

Chairman Dean Yannucci convened the meeting at 8:00 A.M. with 66 members and 54 guests present. Appreciation was expressed to Dave Truax for the fine arrangements for the meeting. Total registration for the Pittsburgh meeting was 182 members and guests and 35 women.

Other comments by Dean are given below under the report of the Administrative Subcommittee. At the conclusion of his report, Dean thanked all those who had helped him during his tenure on the executive of the Transformers Committee noting particularly that the achievements of the Committee were due to the efforts of the many hard working, dedicated members on the Subcommittees, Working Groups and Task Forces.

At the conclusion of Dean's address, Olin Compton thanked him on behalf of the Committee for his six years of dedicated service. Appreciation was expressed to Dean by all those in attendance.

2. APPROVAL OF THE MINUTES OF THE LITTLE ROCK MEETING HELD APRIL 9, 1986

The minutes were approved as issued.

3. REPORT OF THE SUBCOMMITTEES:

3.0 Administrative - D. Yannucci

For the complete Adsubcom report and details on the following points, highlighted by Dean, see Appendix "A".

- Committee Finance and Meeting Arrangements

The next meeting will be held at the Yankee Trader hotel in Fort Lauderdale, May 10 - 13, 1987. Room rates will be \$55, single or double. The registration fee will remain at \$30 and a subsidized Tuesday evening function will be provided to use up some of the Committee's surplus funds. Charlie Honey says that ties will not be permitted at this meeting.

- Future Meetings

The following future meetings have been scheduled:

Fort Lauderdale, FL.	May 10 - 13/87	Yankee Trader Hotel Host: C. C. Honey
New Orleans, LA.	Nov. 1 - 4/87	Monteleone Hotel Host: J. J. Bergeron
Washington, DC.	Apr.10 - 13/88	Host: J. Arnold
Long Beach, CA.	Nov. 6 - 9/88	Ramada Renaissance Hotel Host: R. Ensign
Chicago, Illinois	Spring 1989	Host: L. Stensland

- Operational Manual Update

The operational manual is being updated and will be ready for review by Adsubcom prior to the spring 1987 meeting.

- PES Standards Co-ordinating Committee

Jim Harlow was elected the new chairman replacing Ray Smith who has resigned from the Transformers Committee.

- Technical Council Activities

Dean's report on the IEEE/PES Technical Council Meeting, held July 21/86 in Mexico City, is given in Appendix "A", Attachment B. He emphasized that our image is good, however, we need more support from top management and we need to earn this support. Communicating back to management on our activities and accomplishments is very important.

Fred Huber pointed out that if any member receives a second letter of indemnification, it should be signed and returned to IEEE. The first letter was not valid. Dean will be sending a request to the chairman of all Working Groups and Task Forces requesting them to send copies of their membership lists to IEEE Headquarters.

- Review of ANSI Standards

At the last IEC TC14 meeting held in Holland, the U.S. was presented by Roy Uptegraff, Olin Compton and a NEMA representative. Bill Kennedy was appointed secretary of a new IEC Working Group on Converter Transformers. It was also noted that John Dutton has resigned his position as U.S. Technical Advisor to IEC TC14 and 14B. Bill McNutt has agreed to take over this position.

It was reported that IEC has adopted "C" for temperature and "K" for change in temperature. Dave Douglass and Roy Uptegraff have been asked to determine the impact of this change on liquid filled and dry type standards, such as the loading guides.

- Liaison Activities

Chuck McMillen will be the Transformers Committee's liaison with the Surge Protective Devices Committee's Oil - Immersed Surge Arrester Task Group. The two main concerns of this group are "loadability" and "safety" in the use of under-oil arresters in distribution transformers.

- Committee Membership

Two new members were elected to the Transformer Committee:

Bill Saxon	-	Duke Power Co.
Charles Hoesel II	-	Arizona Public Service Co.

- New Officers of the Transformers Committee

Effective January 1/87 the officers of the Transformers Committee will be:

Chairman	-	Olin Compton
Vice-Chairman	-	Robert Veitch
Secretary	-	John Bergeron

- HVDC Converter Transformers and Smoothing Reactors

Adsubcom voted to establish a new Subcommittee with the above title. Bill Kennedy will be the chairman. The first actions required will be the preparation of a "scope" and a request for Technical Council approval. (See Appendix "A", Item 16(a)).

- Tutorial on Transformer Testing

The PSIM Committee had proposed a joint tutorial with the Transformers Committee on transformer testing, with the Transformers Committee taking the lead in preparing the tutorial. This proposal was voted on and unanimously rejected by Adsubcom. (See Appendix "A" Item 16(b)).

3.1 Audible Sound and Vibration - A. M. Teplitsky (See Appendix "B")

The Subcommittee report was given by Len Swenson as Mr. Teplitsky was unable to attend this meeting.

3.2 Bushings - L. B. Wagenaar -(See Appendix "C")

A suggestion was made that the "scope" of the Bushing Subcommittee should be expanded to include distribution bushings and lower voltage power apparatus bushings. It was noted that Table 8 of C57.12.00, gives the electrical characteristics for power and distribution transformer bushings for system voltages from 34.5 kV to 1.2 kV. These are not covered by IEEE 24. Olin Compton commented that although there is a need from a users point of view, there are so many different types of distribution bushings that it would be difficult to standardize them.

3.3 Dielectric Tests - L. S. McCormick - (See Appendix "D")

At the end of his report, L. S. announced his resignation as chairman of the Dielectric Test Subcommittee. He will continue to be active in the Transformers Committee.

3.4 Dry Type Transformers - R. E. Uptegraff - (See Appendix "E")

3.5 Instrument Transformers - R. B. Stetson -(See Appendix "F")

3.6 Insulation Life - Dave Douglas - (See Appendix "G")

3.7 Insulating Fluids - H. A. Pearce - (See Appendix "H")

It was noted that a seminar on Gas Analysis will be presented at the next meeting in Fort Lauderdale.

3.8 Performance Characteristics - J. D. Borst - (See Appendix "I")

3.9 Recognition and Awards

The following awards were presented at the Transformers Committee:

- Leo Savio - Past Chairman of the Transformers Committee.
- Bill Allen - Past Chairman of the Dry Type Transformer Subcommittee.
- Olin Compton - Past Chairman of the Performance Characteristics Subcommittee.
- Charles McMillen - Past Chairman of the Insulation Life Subcommittee
- Ray Thomas - Past Chairman of the Instrument Transformer Subcommittee

Bill McNutt has resigned his position as chairman of "Recognition and Awards" and this position will be taken over by Dean Yannucci.

PES awards recommendations are given in Appendix "A", Item 13.

3.10 Transformer Standards

The previous chairman, Ray Smith, suddenly resigned as chairman of the Transformer Standards Subcommittee. Jim Harlow was elected the new chairman by Adsubcom. No report was presented at this meeting, however, the next report, to be given in Fort Lauderdale, will cover a 12 month period.

3.11 West Coast Subcommittee - H. Johnson - (See Appendix "J")

4. REPORT OF LIAISON REPRESENTATIVES:

4.0 EPRI

The new EPRI representative, Stan Lingren, introduced himself to the Transformers Committee. As Stan had just joined EPRI, he did not have a report to present. At the next meeting, Stan will report on EPRI activities associated with transformer technology.

4.1 ANSI C89 - S. J. Antalis - (See Appendix "K")

5. TECHNICAL PAPERS FOR FUTURE IEEE/PES MEETINGS:

Olin Compton's report is given in Appendix "A", Attachment "F".

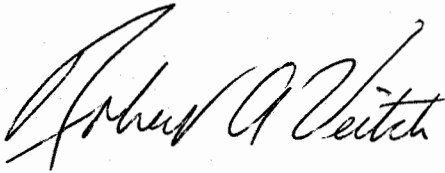
6. NEW BUSINESS:

6.0 Ed Norton pointed out that the symposium on the "Gas Guide" (C57.104), which had been scheduled for the Pittsburgh meeting, had to be cancelled at the last minute which left a void in the meeting schedule. (This symposium will now be held in Fort Lauderdale in May). Ed suggested that we schedule seminars well enough in advance to:

- (a) Ensure that they will be ready, or
- (b) Have a second seminar ready to fill the slot, should the originally scheduled seminar have to be cancelled or postponed.

This suggestion will be considered by the Transformers Committee executive.

6.1 Olin Compton requested that the chairmen of all Subcommittees, Working Groups and Task Forces send copies of their minutes directly to him, as well as copies of all documents now in preparation.



Robert A. Veitch
Secretary

APPENDIX "A"

MINUTES OF MEETING

ADMINISTRATIVE SUBCOMMITTEE

IEEE TRANSFORMERS COMMITTEE
Pittsburgh, PA.
Monday, October 13, 1986.

ATTENDANCE

MEMBERS

J. Borst
D. Douglas
J. Dutton
J. Harlow
H. Johnson
H. Pearce
L. Savio
R. Stetson
L. Swenson (Representing A. Teplitsky)
R. Uptegraff
L. Wagenaar

GUESTS

J. Bergeron
C. Brown
R. Chittim
C. Honey
F. Huber
W. Kennedy
C. McMillen

Administrative Subcommittee

The Adsubcom met at 5:00 p.m. on Monday, October 13, 1986 with 13 members and eight guests present.

1. Introductions were made.
2. Minutes of the Little Rock meeting were approved as written.
3. Committee Finance and Meeting Arrangements

Charlie Honey reported that the next meeting, to be held at the Yankee Trader hotel in Fort Lauderdale, May 10-13, 1987, will have room rates of \$55 single or double. By holding the meeting at this time, very favourable rates were obtained. The question of deficit financing was raised and it was agreed by Adsubcom that a deficit of \$1,000 - \$1,500 would be allowed. Any subsidized trips, luncheons etc., should be for all members not just the women. The method of generating the deficit will be up to Charlie except that the registration fee should stay in the \$30.00 range.

4. Status of Operational Manual Update

Leo Savio reported that the draft of the revised manual will be sent out to Adsubcom members one month prior to the next meeting so that it can be reviewed at the next meeting. The revised manual will include an appendix with the Meeting Host Guide. Leo welcomes any suggestions for changes. Rules for "Emeritus Members" should be considered for inclusion in the manual.

Leo also highlighted the new ANSI "Style Manual for Preparation of Proposed American National Standards". Copies of this manual will be sent to all Adsubcom members.

5. Review of PES Standards Co-ordinating Committee

Olin Compton presented a short report which indicated the new chairman, Ray Smith, had resigned from the committee and his position at TVA. (See Attachment "A"). Jim Harlow was recommended as a replacement for Ray Smith. Jim was nominated to this position by Dean Yannucci, seconded by Rob Veitch, and elected unanimously by Adsubcom. Jim accepted this nomination.

6. Review of Technical Council Activities

Dean Yannucci presented his report on the IEEE/PES Technical Council Meeting held July 21, 1986 in Mexico City. (See Attachment "B"). The following points were brought to Adsubcom's attention:

Page 2 - "We need more support from management for our volunteer organization" and "We need to earn management support".
These are important items in these days of cut-backs.

Page 3 - The new PES Administrative Committee, effective January 1, 1987, is listed.

Page 5 - Standards Coordinating Committee

Item 2 - If any member received a second letter of indemnification, it needs to be signed and returned. The first letter was not valid.

Fred Huber will comment on this at the Transformer Committee meeting.

Item 3 - Consideration is being given to limiting the life of a PAR to eight years. After this time it would have to be resubmitted.

Item 4 - A Standards seminar is in the works. The time will likely be late September or early October, 1988.

7. Standards Projects

Fred Huber presented an IEEE Standards Status Report, dated July 15, 1986, covering the status of all IEEE Standard and Standards Projects as reported to the Standards Headquarters Office as of the reporting date. The pertinent data for the Transformers Committee will be included with the minutes of Adsubcom as Attachment "C".

8. Review of ANSI Standards

John Dutton reported on the last IEC TC14 meeting held in Holland. The U.S. representatives were Roy Uptegraff, Olin Compton and a NEMA representative. The main topic of discussion was the loading guide. This delegation had no success in getting TC14 to follow North American practice. It was also reported that Bill Kennedy will be the secretary of a new IEC Working Group on Converter Transformers.

John also noted that he has resigned his position as U.S. Technical Advisor to IEC Technical Committees 14 and 14B. Bill McNutt has agreed to take over this position.

John also reported that IEC has adopted "C" for temperature and "K" for change in temperature. As there is a lot of merit to this change, Dean Yannucci asked Dave Douglass and Roy Uptegraff to determine what would be involved in making this change in all liquid filled and dry type standards where temperature and change in temperature are involved, e.g. Loading Guides. Dave Douglass has also proposed new symbols for temperatures and change in temperature for the new combined loading guides. These will be sent to all Adsubcom members for comment.

John also recommended that one individual should be assigned the responsibility of keeping a record of all changes approved for a standard. When the standard is finally submitted for IEEE and ANSI approval, we can then be sure that all changes have been included. This is especially true for C57.12.00 and 12.90 where numerous changes can be approved prior to printing a new edition. Adsubcom recommended that Jim Harlow be assigned this responsibility.

9. Subcommittee Activities Discussion

- (a) Audible Sound - It was reported by Len Swenson that major revisions are being made to Section 13 of C57.12.90. Also, a seminar on sound will be held on Tuesday afternoon at the New Orleans meeting. The seminar will last about two hours and five people will give presentations.
- (b) Bushings - L. Wagenaar
The new home for bushing standards will be C57.19. Lorne reported that the Bushing Application Guide (P800) was never approved by the Transformers Committee or the IEEE Standards Board. It will be updated and submitted for approval.

The Bushing Subcommittee was asked by a user to have the bushing draw lead material and cross-sectional area stated on the transformer outline drawing. The draw lead is not part of the bushing, therefore does not come under the Bushing Subcommittee. Lorne will pass this request on to the Performance Characteristics Subcomm.

- (c) Dielectric Tests - L. S. McCormick
There should be a successful ballot on the new Partial Discharge Trial Use Guide.
L. S. announced his resignation as chairman.
- (d) Dry Type Transformers - R. Uptegraph
Dry type loading guide and cast coil standards are now in progress.
- (e) Instrument Transformers - Ralph Stetson
The primary recent activity of the Instrument Transformers Sub-Committee has been progression of the letter ballot of P546/D5 Standard Requirements for Instrument transformers, a complete revision of C57.13. Results on the ballots are:

64 approved
9 approved with comments
3 not approved
11 not voting
16 not responding

Initial response to comments and negative ballots has been completed. The Subcommittee will address these items further in the 10/14/86 meeting.

- (f) Insulating Fluids - Henry Pearce
The seminar on the new gas guide, C57.104, originally scheduled for this meeting will now be held on Tuesday afternoon in Fort Lauderdale.
- (g) Performance Characteristics - John Borst
C57.105, Guide for Application of Transformer Connections in Three Phase Distribution Systems was reaffirmed at the Transformer Committee meeting in Little Rock. This information was never submitted to the IEEE Standards Board. Jim Harlow was asked to take on this task.

(h) Standards

The former chairman L. R. Smith has resigned from the Transformers Committee as he has taken a new job out of the country. The new chairman will be Jim Harlow.

(i) West Coast - Herb Johnson

Good progress is being made on the Loss Evaluation Guide. Meetings were held in Anaheim and Pittsburgh. The work on consolidating the transformer installation guides has been delayed due to the illness of the working group chairman.

10. Liaison Activities

(a) Liaison to IEEE SPD Committee's Oil - Immersed Surge Arrester Task Group of Working Group 3.3.10. C. J. McMillen's letter of October 10/86 to Yannucci and Borst was discussed. (See Attachment "D"). The Transformers Committee was asked to take the lead in developing design tests addressing the two main concerns in this letter. With regard to the concern that, "the under-oil arrester will not limit the loadability of the transformer nor the transformer's insulation system and not limit the protective effectiveness of the arrester," Dean Yannucci recommended that it should be up to the manufacturers to prove that the device is safe. With regard to the safety aspect, the primary concern is the consequences of failure of the arrester within the transformer. This should be referred to NEMA.

(b) NEMA representative R. C. Chittim, submitted the "Fall 1986 Report of ASC C57 Committee." (See Attachment "E") Subcommittee chairmen should review and update this report and send any changes to Mr. Chittim.

11. Technical Paper Activities and AdHoc Publications Committee

A report dated October 5/86 was submitted by Olin Compton. (See Attachment "F")

12. Committee Membership Review and Nominations

It was pointed out by Dean Yannucci that Subcommittee chairmen should always be looking for good new members who can make a contribution to the work of the Transformers Committee.

The following new members were accepted by Adsubcom:

Bill Saxon	- Duke Power Co.
Charles Hoesel II	- Arizona Public Service Co.

Sam Foster has requested membership "emeritus" status. This was approved by Adsubcom. All "emeritus" members will be added to the Transformers Committee membership list. Emeritus members will have an * beside their name to denote this status. This is the system now used in the organizational manual.

13. PES Awards

Although Bill McNutt was unable to attend the Adsubcom meeting, the following report was given on his behalf. The recommendations are as follows:

- PES Prize Paper Award
Mathematical Modelling of Bubble Evolution in Transformers - McNutt, Rouse and Kaufmann.
- PES Working Group Recognition Award - Technical Report
Dielectric Tests and Test Procedures for Converter Transformers and Smoothing Reactors.
- PES Working Group Recognition Award - New Standard Publication
Working Group on Transformer Through Fault Current Duration Guide - ANSI/IEEE C57.109.
- Transformer Committee Prize Paper Award.
Same as the PES prize paper award.
- Transformer Committee Outstanding Service Award
C. J. McMillen

14. New Officers

Effective January 1/87 the new officers of the Transformers Committee will be:

Chairman	-	Olin Compton
Vice Chairman	-	Rob Veitch
Secretary	-	John Bergeron

15. Future Transformers Committee Meetings

The spring meeting in 1989 will be held in Chicago. The host will be Len Stensland.

16. New Business

- (a) D. C. Converter Transformers and Smoothing Reactors.
As reported in the minutes of the April 7/86 meeting of Adsubcom, the questions of the formation of a Subcommittee to cover these products was discussed. No consensus was reached at that meeting. Bill Kennedy again raised this questions at this meeting. After discussing this subject, it was moved by Bill Kennedy, seconded by Leo Savio, that a new subcommittee be formed. The subcommittee title will be, "HVDC Converter Transformers and Smoothing Reactors". This motion was unanimously approved by Adsubcom. Bill Kennedy will be the chairman. The first action required will be the preparation of a scope to cover the work of the subcommittee followed by a request for Technical Council approval.

(b) Tutorial on Transformer Testing.

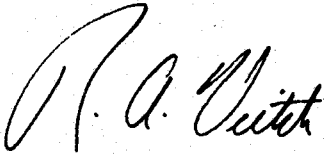
In a letter sent to Dean Yannucci by Mr. Malewski, it was proposed that a tutorial be prepared, jointly sponsored by the Transformers Committee and the Power Systems Instrumentation and Measurement Committee. Mr. Malewski suggested that the Transformers Committee take the lead in preparing this tutorial. He also volunteered contributions by various IREQ staff members covering the topics of partial discharge measurement, loss measurement and digital measurement of impulse voltages.

It was moved by Dean Yannucci, seconded by Olin Compton, that a tutorial on transformer testing be jointly prepared by PSIMC and TC. This motion was voted on by Adsubcom with the following results:

For	-	0
Opposed	-	All

Dean Yannucci will inform Mr. Malewski of the decision of the Adsubcom.

17. Appreciation to Retiring Chairman Dean Yannucci. Adsubcom expressed their appreciation to Dean Yannucci for the leadership and hard work given by him during his tenure in office.



R. A. Veitch,
Secretary.

ATTACHMENT "A"

REPORT ON STANDARDS COORDINATING COMMITTEE

This will be short and -- hopeful. Ray Smith agreed to become our member on the Standards Coordinating Committee several months ago. Based on copies of correspondence and comments from members and others, Ray was doing an excellent job for our Transformers Committee. A much better job, I admit, than I had done.

Then, suddenly out of the blue -- Ray resigned from TVA, from the Transformers Committee, and moved with his family to a consulting job in Thailand.

So --- We are without a representative to the Standards Coordinating Committee and without any records or information as to the current status of our projects.

I propose to work with Bob Veitch, Fred Huber, and others to try to get this important responsibility under control in the near future.

Olin Compton,
5 October 1986



ATTACHMENT "B"

POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

Report on
Technical Council Meeting

IEEE PES

Mexico City, Mexico

July 21, 1986

The Technical Council meeting was held on July 21, 1986 at the 1986 PES Summer Meeting.

Chairman's Report (Frank Denbrock)

The PES Executive Board meeting was held April 16, 1986 in Pittsburgh, PA. The following are highlights:

Our request to have Corresponding Membership on CIRED was delayed until the next meeting of CIRED Scientific Directing Committee scheduled for May 9, 1986.

Some of the reviewed papers for Mexico City will be considered at Panel Sessions for the IEEE PES T&D Conference.

To help fulfill PES President Hissey's request that Technical Council members provide more public affairs-type technical documents, the Chairman of Power System Relaying Committee, Donald R. Volzka, has recommended three candidates for this type of publication. They are:

1. Fuel by Wire: The facts of life in today's utility operations.
2. Nuclear Power: Where are we; why are we there; and where should we be going?
3. Downed Conductors: Why they can't always be detected.

PSRC plans to submit suggested outlines for each paper during the Mexico City Technical Council meeting.



POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

(2)

Comments received on the state of the society were:

Our need to recognize change and our ability to manage that change all about us in everything we do.

The pocketbook issue is important, particularly to the young engineers. PES leadership needs to identify the changing needs and go about filling those needs in a coordinated manner with appropriate programs and activities as soon as possible.

We need to recognize that IEEE and PES is a volunteer organization. Developing appropriate methods to motivate volunteers through adequate and timely awards and recognitions are needed. There is a definite need to improve overall motivational formats, and this is a critical item to date.

The following additional thoughts were discussed at the Executive Board Committee meeting:

Image is generally considered good.

Need better (more) support from management for our volunteer organization.

We need to involve larger number of people for Chapter activities.

We need to "earn" management support.

Middle Management involvement at local level.

Survey of Chapter members as to their interests.

Broader package of awards to younger engineers.

President Hissey reported that a cooperative effort is underway between EEI and PES to develop a Career Information Program with electric utility industry to high school and college students.



POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

(3)

Treasurer R. E. Fenton's report was approved and the following motions passed:

A motion was passed by the Executive Board to set the 1987 non-member rate for the PES Review at \$75.

A motion was passed that the 1987 non-member rate for PES Transaction be \$100-EC, \$115-PS, and \$115-PD.

The Chapters Council reported that Tai Wong will serve as Chapters Council Liaison to Technical Council. We will carry on the efforts initiated by Hal Fiedler to continue the program for close cooperation between the Technical and Chapters units.

Robert P. Noberini, Chairman, Public Affairs Council, reported that James F. Strother, Chairman, Education Subcommittee, is now the Division VII PACE Coordinator, and will be working on plans to enhance PES PACE programs and public awareness of them.

A draft of a Policy for Cooperation between CIGRE and PES was submitted and recommended for approval by Publications Department Chairman Sharp.

Chairman L. L. Grigsby summarized his report of the Power Engineering Education Committee. A motion to appropriate \$15,000 to fund the Student Slide Program was passed.

The following slate officers and chairmen for the PES Administrative Committee was approved for the term starting January 1, 1987:

President	- T. W. Hissey
Vice President	- W. B. Behnke
Secretary	- G. B. Niles
Treasurer	- R. E. Fenton
Chapter Council Chairman	- F. E. Schink
Technical Council Chairman	- F. A. Denbrock
Public Affairs Council Chairman	- R. P. Noberini
Awards and Recognition Chairman	- J. W. Pope
Meetings Chairman	- T. A. Balaska



POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

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Publications Chairman	- T. E. Sharp
Constitutional and Bylaws Chairman	- S. H. Horowitz
Education Committee Chairman	- L. L. Grigsby
History Committee Chairman	- J. E. Harder
Long Range Planning	- C. L. Wagner
Nominations and Appointments	- E. F. Chelotti

Items discussed under Other Business were:

Discussion of a PES scholarship fund, perhaps administered by Power Engineering Education Committee, received favorable response. Further discussion will be at the SPM.

The development of goals for each Technical Committee for 1986-1987 are still outstanding. It is desired to have one new and unique technical advance in the Committees area of responsibility and provide a document and suitable reproducible slides for use by the Chapters Council and Public Affairs Council.

Much discussion was held on PES Liaison Representation to the Acoustics Society S2 and S12 Committees. The Acoustics Society charges \$500/year for the privilege of Liaison. Evidently, this is allowed by Society rules. No final decision was made, but the Transformer Committee was asked if they require support. The Chairman will respond to this request.

There is a need to review all subcommittee scopes. Any changes must be approved by PES and be on file with N. Heitmann.

The Substation Committee has elevated W.G. E4 Gas Insulated Substations to Subcommittee status.

Mr. G. L. Gaibrois resigned as Technical Council Secretary and was replaced by J. W. Hagge.

A proposed technical paper allotment 5-year plan is being proposed by W. Elmore. Attachment 1 provides the highlights.

A committee on the improvement of technical session for papers has recommended two task forces within the T&D Committee and the Substation Committee be formed to try new ideas. One of the ideas will be prescreening of slides.



POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

(5)

The Power Engineering Education Committee will be publishing a paper on "The Challenges of Recruitment in Power Engineering." It was reported to be very good.

The Standards Coordinating Committee indicated the following:

1. A severe backlog problem exists with C57 and C37, (mostly C37). This is due to the lack of NEMA staff. New procedures are being identified that may cause the IEEE staff to assume some of the NEMA responsibilities.

The backlog is 68 PES standards with the oldest being four years old.

2. If any member received a second letter on indemnification, it needs to be signed and returned. The first letter was not valid.
3. Consideration is being given to limiting the life of a par, maybe eight years. After this time, it would have to be resubmitted.
4. A Standards seminar is in the works. A date and time for 1988 will be announced.

The Power Electronics Council reported that consideration is being given to making them a separate society. They are now publishing transactions quarterly.

The Transformer Committee Report is given in Attachment 2.

A handwritten signature in black ink, appearing to read 'DAY'.

D. A. Yannucci, Chairman
IEEE Transformer Committee

DAY/bvs

Attachments

REPORT TO TECHNICAL COUNCIL

BY

TC AD HOC PUBLICATIONS COMMITTEE

This Committee has a meeting planned for July 22, 1986. We will make the final corrections in the Publications Guide, and following approval by F. A. Denbrock and T.E. Sharp, it will be released for general distribution.

Also at this meeting we will begin discussion of a proposed new procedure in the handling of Technical Papers to allow more flexibility in the rejection process. The present procedure consists of a determination by Nancy Heitmann of the total number of papers received by the deadline date. Based upon the total annual budgeted paper count and the historical total number of papers presented for the particular meeting involved (such as the Summer Meeting) a Rejection Ratio is then established that is applied uniformly for all Committees. The present procedure imposes a burden on those Committees who may have received only 4 or 5 papers, and it is also a problem where a group of papers are solicited on a particular subject at a time before the Rejection Ratio is established, possibly then requiring rejection of a solicited paper.

Our proposal is to establish a Time Block, such as 5 years, over which an individual Committee may accept a total number of papers. That Committee may borrow from its future meeting allotment or set aside part of its present allotment for future use. It may also borrow from, or loan to, another Committee, with appropriate supervision of the process by someone assigned the explicit task of keeping the process balanced.

This procedure would not be expected to alter the total annual budgeted page count and would allow the process of paper planning to be somewhat more orderly.



W. A. Elmore, Chairman
TC Ad Hoc Publications Committee



POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

Report to PES Technical Council

Transformer CommitteeMeetings

The Transformer Committee, Subcommittees and Working Groups met in Little Rock, Arkansas, April 7-9, 1986 with 162 members and guests. Future meetings scheduled are:

Pittsburgh, PA	October 12-15, 1986
Ft. Lauderdale, FL	May 10-13, 1987
New Orleans, LA	November 1-4, 1987
Washington, DC	April 10-13, 1988
Long Beach, CA	Fall 1988

Organization - Personnel

Chuck McMillen, Subcommittee Chairman of Insulation Life resigned after many years of distinguished service. Mr. Dave Douglas has been accepted to replace Mr. McMillen.

Mr. Ray Smith of TVA, presently Chairman of the Standards Subcommittee, has assumed the duties of Liaison to the Standards Coordinating Committee.

Mr. C. V. Brown of FP&L assumed the duty of Chairman of the Working Group on Dielectric Tests for Distribution Transformers.

Mr. Olin Compton replaced Mr. John Dutton as Chairman of the IEEE Delegation to ANSI C57.

Approvals for PAR Preparation

1. Failure Investigation and Analysis for Power Transformers
2. Thermal Evaluation of Power Transformers
3. Fire Prevention Guide for Transformers



POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

[2]

Report to PES Technical Council

Transformer CommitteeStandards Activities

Attached is a copy of the Transformer Committee projects' status. In addition, C57.105 was reaffirmed by the Committee.

Technical Sessions

Twelve papers were reviewed for the 1986 Summer Meeting. It is expected two sessions will be held.

Twenty papers are under review for the 1986 T&D Conference.

A handwritten signature in cursive script, appearing to read 'Dean A. Yannucci'.

Dean A. Yannucci, Chairman
IEEE Transformer Committee

DAY/bvs

Attachment

July 15, 1986

ATTACHMENT "C"

IEEE STANDARDS STATUS REPORT

This document gives the known status of each IEEE Standard and Standards Project as reported to or available at the Standards Headquarters Office as of the report date. The document has been divided into Sections for the purpose of easy reference:

Section

1. Numerical Index (with Reference to the Sponsoring IEEE Society)
2. Cross Reference (Alpha-Numeric and Numeric-Alpha of ANSI and IEEE)
3. Sponsoring Society (with Abbreviation, Society, and Staff Liaison)
4. Status report of IEEE Standards and Projects
(alphabetical by abbreviation of Sponsor)

An explanation of the computer format used in Section 4 is provided on the reverse side.

Tue Aug 14 1984

IEEE STANDARDS OFFICE

QUARTERLY STATUS REPORT

EXPLANATION OF SECTION 4 STRUCTURE

Soc'ty Comm	Proj	Standard Date	Std Date	Subject
QEA		586	-88	Laser-Maser Terms

Abbreviated Title

RECORDS SELECTED 00001
No. of Standards
or Projects

Abbreviation for Society
(and Committee)

Project initiated

Numerical designation

Year of publication
of latest edition

[X indicates current
edition not yet published]

Contact	Last Update	A/S Code	PAR Date	Comments
	6/7			ANSI Appvd 83. Current
Individual designated by Committee to receive correspondence			PAR approval date	ANSI Approval date
Computer entry date				Miscellaneous Information
Activity Status Code (to be established, in future reports)				

CROSS REFERENCE LIST - ANSI vs IEEE STANDARDS NUMBERS

Note: Numbers marked (+) are assigned to SUB.
 Numbers marked (*) are assigned to PSRC.
 C62 numbers are assigned to SPD.
 Balance of C37 numbers are assigned to SWG.
 Balance of C57 numbers are assigned to TR.
 All other numbers are referenced in the IEEE
 Numerical/Committee List.

<u>ANSI</u>	<u>IEEE</u>	<u>ANSI</u>	<u>IEE</u>	<u>ANSI</u>	<u>IEEE</u>
C16 .5	152	C37 .04	440	C37 .27	331
.11	149	.04c	747	.29	508
.12	185	.04e	(C37.100b)	.30	324
.13	190	.04g		.30h	410
.19	186	.04h		.34	326
.20 Wdn	207	.05 Wdn	19	.35	578
.21	146	.09	579	.36	413
.23	202	.09b	747	.37	414
.25	213	.010	320	.38	760
.26	172	.010c	747	.40	552
		.011	701		
.28	181	.012	702	C37 .41	412
.29	150	.071 Wdn	439	.48	418
.30	168			.60	437
.31	205	C37 .072 Wdn	327	.61	321
.33	206	.0721 Wdn	328	.63	542
.34	208	.073 Wdn	341	.64	843
.35	163	.0731 Wdn (342)		.66	543
.37	167	See C37.012		.71	496
.38	145	.0731a Wdn	342A	.72 Wdn	699
.39	184	.074 Wdn	339	.81	744
		.076 Wdn (340)			
.40	211	See C37.04 & .09		C37 .82	826
.41	264	.077	670	.90	313*
.42 Wdn	285	.078 Wdn (343)		.90a	472*
.43	287	See C37.04		.90.2	734*
.44 Wdn	294	.079 Wdn	417	.91	273*
.46	189			.93	305*
.47	390	C37 .081	411	.95	357*
.48	470	.082	419	.96	588*
.49	474	.1	565+	.97	520*
.60	376	.2	26+	.98	501*
		.4 Wdn	689	.99	569*
.61	392	.4a,b,c,d Wdn		.100	---
.62	455	.5 Wdn	598	.101	490*
		.6 Wdn		.102	604*
C19 .1 Wdn	15	.13	20	.103	815*
		.13a	538	.104 Wdn	677*
C34 .3	444	.14	536	.105	798*
		.18	537	.106	750*
C37 .XX	---			.107	---
C37 .XX	22A	C37 .20	27	.122	468+
C37 Wdn	526*	.21	568		
C37 .XX	632	.23	298		
C37 .XX	818	.24	144		
C37 .XX	1080*	.26	330		

<u>ANSI</u>	<u>IEEE</u>	<u>ANSI</u>	<u>IEEE</u>	<u>ANSI</u>	<u>IEEE</u>
C42 .05 Wdn	270	C57 .111	513	N41 .6	382
C42 .100	100	.112	523	.7	344
C48 .1	16	.113	545	.8	381
C50 .20	112	.115	756	.9	334
.21	114	.116	785	.10	383
.22	43	.117	786	.11	567
.24	95	.119	838	.12	308
.25	56	.120	842	.13	387
.26	429	.121	954	.14	384
.30	67	.122	1056*	.15	450
.31	434	.123	1098	.17	420
.32	117	.124	---	.18	415
.33	492	C60 .9	161	.19 Wdn	385
.34	433	.15	158	N41 .24	484
.35	86	C62 .1	28	.25	485
.42	432	.2	684	.26	497
.45	86	.2A	1041	.27	466
C55 .1	18	.2B Wdn	1041	.28	494
.2	824	.11	819	.29 Wdn	279
C57 .12.00	462/787	.21	687	.30	603
.12.01	681	.22	---	.31	535
.12.11	283	.31	465.1	.35 Wdn	573
.12.12	514	.32	465.2	.36	627
.12.14	740	.33	465.3	.37	628
.12.56	65	.36	1039	.39	622
.12.58	745	.41	587	N41 .41	566
.12.59	1052	.42	769	.43	650
.12.60	---	.43	950	.51	317
.12.80	591	.44	953	N42 .1	300
.12.90	262/787	.45	932	.2	301
.12.91	682	.47	1093	.3	309
C57 .13	546	.62	1038	.7 Wdn	279
.13.1	584*	.91	32	.8	325
.13.3	860*	.92A	143	.9	398
.13.4	832	C68.1	4	.11	759
.15	801	.2 Wdn	332	N45 .2.4	336
.16	732	.3	454	.2.14	467
.18.10	---	C76.1	21	.2.16	498
.19.00	21	.2	24	.3	317
.19.01	24	.3	(757)(800)	S 1 .5 Wdn	219
.19.02	852	C77.1	29	S 4 .1 Wdn	192
.19.101	757	C83.3 Wdn	176	.3 Wdn	193
.19.100	800	.17 Wdn	177	.6 Wdn	347
.21	733	.23 Wdn	178	Y10 .5	280
C57 .91	631	.24 Wdn	179	.19	260
.92	507	C100.3	310	Y32 .2	315
.93	631	C111.1	101	.9	42
.94	547	C114.1	142	.14	91
.98	93	C119.2	386	.16	200
.99	731	N4 .1 Wdn	278	.21	623
.100	345	N41 .2	379	Z51 .1 Wdn	193
.102	76	.3	338		
.103	423	.4	352		
.104	.424	.5	323		
.105	593				
.106	64				
.109	784				
.110	---				

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<u>IEEE</u>	<u>ANSI</u>	<u>IEEE</u>	<u>ANSI</u>	<u>IEEE</u>	<u>ANSI</u>
4	C68.1	176	C83.3 Wdn	321	C37.61
15	C19.1 Wdn	177	C83.17 Wdn	323	N41.5
16	C48.1	178	C83.23 Wdn	324	C37.30
18	C55.1	179	C83.24 Wdn	325	N42.8
19	C37.05 Wdn	181	C16.28	326	C37.34
20	C37.13	184	C16.39	327	C37.072 Wdn
21	C76.1/C57.19.00	185	C16.12		
22A	C37	186	C16.19	328	C37.0721 Wdn
24	C76.2/C57.19.01	189	C16.46	330	C37.26
26	C37.2+	190	C16.13	331	C37.27
27	C37.20			332	C68.2 Wdn
		192	S4.1 Wdn	334	N41.9
28	C62.1	193	S4.3;Z57.1 Wdn	336	N45.2.4
29	C77.2	200	Y32.16	338	N41.3
32	C62.91	202	C16.23	339	C37.074 Wdn
42	Y32.9	205	C16.31	340	C37.076 Wdn
43	C50.22	206	C16.33	341	C37.073 Wdn
56	C50.25	207	C16.20 Wdn		
64	C57.106	208	C16.34	342	C37.0731 Wdn
65	C57.12.56	211	C16.40	(C37.012)	
67	C50.30	213	C16.25	342A	C37.0731a
76	C57.102			Wdn	
86	C50.35	219	S1.5 Wdn	343	C37.078 Wdn
91	Y32.14	260	Y10.19	(C37.04)	
		262	C57.12.90	344	N41.7
93	C57.98	264	C16.41 (111)	345	C57.100
95	C50.24	270	C42.05 Wdn	347	S4.6 Wdn
100	C42.100	273	C37.91*	352	N41.4
101	C111.1	278	N4.1 Wdn	357	C37.95*
112	C50.20	279	N41.29;N42.7 Wdn	376	C16.60
114	C50.21	280	Y10.5	379	N41.2
117	C50.32	283	C57.12.11		
142	C114.1			381	N41.8
143	C62.92	285	C16.42 Wdn	382	N41.6
144	C37.24	287	C16.43	383	N41.10
145	C16.38	294	C16.44 Wdn	384	N41.14
		298	C37.23	385	N41.19 Wdn
146	C16.21	300	N42.1		
149	C16.11	301	N42.2	386	C119.2
150	C16.29	305	C37.93*	387	N41.13
152	C60.5	308	N41.12	390	C16.47
158	C60.15	309	N42.3	392	C16.61
161	C60.9	310	C100.3	398	N42.9
163	C16.35	313	C37.90*	410	C37.30h
167	C16.37	315	Y32.2		
168	C16.30	317	N41.52;N45.3		
172	C16.26	320	C37.010		

<u>IEEE</u>	<u>ANSI</u>	<u>IEEE</u>	<u>ANSI</u>	<u>IEEE</u>	<u>ANSI</u>
411	C37.081	507	C57.92	699	C37.72 Wdn
412	C37.41	508	C37.29	701	C37.011
413	C37.36	513	C57.111	702	C37.012
414	C37.37	514	C57.12.12	731	C57.99
415	N41.18	520	C37.97*	732	C57.16
417	C37.079 Wdn	523	C57.112	733	C57.21
418	C37.48	526	C37* Wdn	734	C37.90.2*
419	C37.082	536	C37.14	740	C57.12.14
420	N41.17	537	C37.18	744	C37.81
423	C57.103	538	C37.13a	745	C57.12.58
		542	C37.63	747	C37.04c
424	C57.104	545	C57.113	747	C37.04g
429	C50.26	546	C57.13	747	C37.04h
432	C50.42	547	C57.94	747	C37.09b
433	C50.34	552	C37.40	747	C37.010c
434	C50.31	565	C37.1+		
437	C37.60	566	N41.41	750	C37.106*
439	C37.071 Wdn	567	N41.11	756	C57.115
440	C37.04	568	C37.21	757	C76.3/C57.19.101
444	C34.3	569	C37.99*	759	N42.11
450	C41.15	573	N41.35 Wdn	760	C37.38
		578	C37.35	769	C62.42
454	C68.3	579	C37.09	784	C57.109
455	C16.62			785	C57.116
462	C57.12.00	584	C57.13.1*	786	C57.117
465.1	C62.31	587	C62.41	787	C57.12.00/12.90
465.2	C62.32	588	C37.96*	798	C37.105*
465.3	C62.33	591	C57.12.80	800	C76.3/C57.19.100
466	N41.27	593	C57.105	801	C57.15
467	N45.2.14	598	C37.5	815	C37.103*
468	C37.122	603	N41.30	818	C37
470	C16.48	604	C37.102*	819	C62.11
472	C37.90a*	622	N41.39	824	C55.2
		623	Y32.21		
474	C16.49			826	C37.82
484	N41.24	627	N41.36	832	C57.13.4
485	N41.25	628	N41.37	838	C57.119
490	C37.101*	631	C57.91	842	C57.120
492	C50.33	632	C37	843	C37.64
494	N41.28	638	C57	852	C57.12.02 Wdn
496	C37.71	650	N41.43	860	C57.13.3*
497	N41.26	670	C37.077		
498	N45.2.16	677	C37.104* Wdn	932	C62.45
501	C37.98*	681	C57.12.01	950	C62.43
		682	C57.12.91	953	C62.44
		684	C62.2	954	C57.121
		687	C62.21	1038	C62.62
		689	C37.4c Wdn	1039	C62.36
				1041	C62.2A
					C62.2B Wdn
				1052	C57.12.59
				1056	C57.122*
				1080	C37*
				1093	C62.47
				1098	C57.123

Activity Code	Proj	Standard	Std Date	Subject	Last Update	A/S Code	PAR Date	Comments
PE/TR		21	-77	Outdoor Apparatus Bushings;Req&Tst	7/86		9/79 D7 to Cate LB (C57.19.00)	
PE/TR		24	-84	Outdoor Apparatus Bushings;Char & Dim	7/86		ANSI Apvd B3. (C57.19.01)	
PE/TR		259	-74	Insln Sys Specity Xfrms	7/86		(R80)WG reorganized. Consider reaf	
PE/TR	P	513	-	Seismic Guide for Pwr Xfrms & Reactors	3/86		9/73 StB returned to cate	
PE/TR	P	523	-	Control of Transformer Sound	7/86		12/73 Cate active 8/82. (C57.112)	
PE/TR	P	545	-	Partial Discharge Corona Tst/Xfrms	7/86		5/74 D6(TU)to Subcate LB.(C57.113)	
PE/TR		637	-85	Rclatn Insltg Oil & Crtra for Use	7/86		ANSI Apvd 6/86	
PE/TR	P	638	-	Type Tests of Class 1E Xfrms for NP6S	7/86		9/76 D14 to NPEC-2 for LB.(C57.XX)	
PE/TR		756	-84	Loading Mnrl Oil-Imrsd Pwer Xfrms	7/86		C57.115	
PE/TR		757	-8X	Bushing Application Guide	7/86		C57.19.101 (to include P800)	
PE/TR	P	785	-	Transformers Connected to Generators	7/86		6/79 D7 under development (C57.116)	
PE/TR		786	-8X	Xfrmr Failure Rprtn & Rlbtly Anlysis	7/86		StB Apvd 6/86.To C57 LB (C57.117)	
PE/TR	P	787	-	Xfrmr Loss Measurements & Tolerances	7/86		6/79 C57.12.00c & C57.12.90e	
PE/TR		799	-8X	Handling & Disposing of Askarels	7/86		StB Apvd 3/86. ANSI Pub Rev 6/86	
PE/TR	P	800	-	Bushing Application Guide	7/86		9/79 To be redesignated 757 (C57.19.101)	
PE/TR	P	832	-	Partial Disch/Instru Xfrms(Corona)	7/86		5/80 Tabled. Inc w/C57.13?(C57.13.4)	
PE/TR	P	838	-	Performing Overload Heat Runs	7/86		9/80 D9 to Subcate&WG LB(C57.119)	
PE/TR	P	842	-	Pwr Xfrms & Reactors;Loss Eval	7/86		9/80 D12 to Subcate (C57.120)	
PE/TR	P	954	-	HiTemp Hydrocrbn Lqd	7/86		6/82 D6 to Subcate LB (C57.121)	
PE/TR	P	1098	-	Xfrmr Loss Measurement	7/86		6/85 Developing initial draft.(C57.123)	
PE/TR		C57	-86	C57 Series	7/86		Consolidates C57 documents	
PE/TR		C57.100	-8X	Thral Eval Oil-Imrsd Distr Xfrms	3/86		StB Apvd 9/85. ANSI Apvd B5	
PE/TR		C57.102	-74	Xfrmr Askarel in Eqpt	3/86		9/79 (IEEE 76)	
PE/TR		C57.103	-8X	New/Unused Xfrmr-Type Askarels	3/86		StB Apvd 9/76 Not publ Cate Rqst	
PE/TR		C57.104	-78	Generated Gases in Oil-Immersed Transfor	7/86		6/82 Revision in progress	
PE/TR		C57.105	-78	Xfrmr Connections in 3-Phone Distr Sys	3/86		(IEEE 593) ACTION DUE	

ty	Proj	Standard	Std	Subject	Last	A/S	PAR	Comments
Code			Date		Update	Code	Date	
PE/TR		C57.106	-77	Insulating Oil in Eqpt	7/86		6/86 ANSI ext 12/87.	Revision underway
PE/TR		C57.109	-85	Xfrmr thru Fault Current Duration	3/86			ANSI Apvd 85
PE/TR		C57.110	-8X	Harmonic Load-Current Heating of Xfrmr	7/86			StB Apvd 6/86. To C57
PE/TR	P	C57.111	-	Silicone Lqd in Eqpt/Accept&Maint	7/86			D9 to Cate LB.No PAR on file
PE/TR	P	C57.112	-	Control of Transformer Sound	7/86		12/73	Cate active 8/82. (523)
PE/TR	P	C57.113	-	Partial Discharge Corona Tst/Xfrms	7/86		5/74	D6(TU)to Subcate LB.(545)
PE/TR		C57.115	-84	Loading Mnrl Oil-Imrsd Pwr Xfrms	7/86			(756)
PE/TR	P	C57.116	-	Transformers Connected to Generators	7/86		6/79	D7 under development (785)
PE/TR		C57.117	-8X	Xfrmr Failure Rprtg & Rblty Anlysis	7/86			StB Apvd 6/86.to C57 LB. (786)
PE/TR	P	C57.119	-	Performing Overload Heat Runs	7/86		9/80	D9 to Subcate&WG LB (838)
PE/TR		C57.12.00	-80	Lqd-Imrsd Distr/Pwr&Reg Xfrms	3/86			To be reprinted w/C57.12.00f.IEEE46
PE/TR	P	C57.12.00c	-	Xfrmr Loss Measurements & Tolerances	7/86		6/79	Under development (787)
PE/TR		C57.12.00d	-8X	Wording for Ratio Tolerance Section	7/86			StB Apvd 6/86.To C57 LB
PE/TR	P	C57.12.00e	-	Dielectric Test Req	3/86		9/81	(IEEE 462e)
PE/TR		C57.12.00f	-8X	Alternate Dielectric Test Req	7/86			StB Apvd 6/85.C57 LB
PE/TR	P	C57.12.00g	-	Telephone Influence Test	7/86		6/86	
PE/TR		C57.12.01	-79	Dry-Type Distr & Pwr Xfrms	7/86		9/82	D1 to WG
PE/TR		C57.12.11	-80	Oil-Imrsd Xfrms(18000KVA & Lgr)	7/86			Under revision? No PAR on file
PE/TR		C57.12.12	-80	EHV Oil-Imrsd Xfrms(345kV & Above)	3/86			(IEEE 514)
PE/TR		C57.12.14	-82	Dielectric Tst Req Pwr Xfrms	3/86			(IEEE 740)
PE/TR		C57.12.56	-8X	Thermal Eval Insul Sys Vent'l'd Dry Type	3/86			StB Apvd 12/81.ANSI Apvd 8/84
PE/TR	P	C57.12.58	-	Transient Analysis/Dry-Type Xfrms	7/86		6/78	Coordination review
PE/TR	P	C57.12.59	-	DryType Xfrmr Thru-Fault Current Durat'n	3/86		9/84	Expect submittal (1052)
PE/TR	P	C57.12.60	-	Thermal Eval/Solid Cast/Resin Encap Xfrm	3/86		12/85	
PE/TR		C57.12.80	-78	Power & Distr Xfrms/Terminology	7/86			(RB6)ANSI PubRev3/86 C57 LB
PE/TR		C57.12.90	-80	Test Code for Lqd-Imrsd Distr/Pwr&Reg Xf	3/86		3/82	To be reprinted w/C57.12.90a.IEEE26

Soc'ty Comm	Proj Standard	Std Date	Subject	Last Update	A/S Code	PAR Date	Comments
PE/TR	C57.12.90a	-8X	Alternate Dielectric Test Reqs	3/86			StB Apvd 6/85. C57 LB
PE/TR	P C57.12.90b	-	Sound Power Measurement	7/86		6/86	
PE/TR	P C57.12.90e	-	Xfrmr Loss Measurements & Tolerances	7/86		6/79	D8 apvd by cate (787)
PE/TR	P C57.12.90e1	-	Section B.1 & B.2.2	7/86			D4 under development.No PAR
PE/TR	P C57.12.90e2	-	Section B.3.2.1;Dele B.3.3	7/86			D8 apvd by cate.No PAR on file
PE/TR	P C57.12.90e3	-	Section B.2.1	7/86			Await addl data.No PAR on file
PE/TR	C57.12.91	-79	Dry-Type Distr & Pwr Xfrms/Test Code	3/86		9/82	(IEEE 682)
PE/TR	P C57.121	-	HiTemp Hydrocrbn Lqd	7/86		6/82	D6 to Subcate LB (954)
PE/TR	P C57.123	-	Xfrmr Loss Measurement	7/86		6/85	Developing initial draft (1098)
PE/TR	P C57.124	-	Partial Discharge Tests/Dry Type Xfrms	7/86		3/86	D2 to LB.Coordinate w/.12.81&.12.91
PE/TR	C57.13	-78	Instrument Transformers Requirements	7/86			(R86) To C57. May need supplement
PE/TR	P C57.13.4	-	Partial Disch/Instru Xfrms(Corona)	7/86		5/80	Tabled.Inc w/C57.13?(832)
PE/TR	C57.15	-8X	Step-Vltge&Induction Vltge Reg	7/86			StB Apvd 6/86. To C57
PE/TR	P C57.16	-	Current Limiting Factor Reactor Stds	3/86		3/78	(IEEE 732)
PE/TR	P C57.18.10	-	Semiconductor Rectifier Transformer	7/86		12/81	D3 under development
PE/TR	C57.19.00	-77	Outdoor Apparatus Bushings;Req&Tst	7/86		9/79	D7 to Cate LB (IEEE 21)
PE/TR	C57.19.01	-84	Outdoor Apparatus Bushings;Char & Dim	7/86			ANSI Apvd 83. (IEEE 24)
PE/TR	C57.19.101	-	Bushing Application Guide	7/86			To include 757 and 800
PE/TR	C57.21	-81	Shunt Reactors Over 500kVA	7/86			Task Force Level
PE/TR	C57.91	-81	Ldg Mineral Oil-Imrsd Ovrhd&Pad-Mntd Dis	3/86		6/85	(IEEE 631)
PE/TR	C57.92	-81	Mnrl Oi-Imrsd Pwr Xfrms Up to 100 MVA	3/86		6/85	See C57.91 (IEEE 507)
PE/TR	P C57.93	-	Liquid-Immersed Pwr Xfrms/Instln	7/86		12/82	Under development
PE/TR	C57.94	-82	Dry-Type Genl Purpose Distr&Pwr Xfrms	3/86			(IEEE 547)
PE/TR	C57.95	-8X	Oil-Immersed Voltage Regulators/Loading	7/86			ANSI Apvd 85.Expect publication
PE/TR	P C57.96	-	Thermal Eval Dry-Type Xfrms	7/86		9/81	D8 to WG & DT Xfrms LB
PE/TR	C57.98	-8X	Transformer Impulse Test	3/86			ANSI Apvd 85
PE/TR	P C57.99	-	Loading Current Limiting Reactors	3/86		3/78	(IEEE 731)

15 July 1986

STANDARDS COORDINATING COMMITTEES (SCCs)
WITHIN THE IEEE STANDARDS BOARD

<u>Designation</u>	<u>Title</u>	<u>Chairman</u>	<u>Staff/Secretary</u>
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SCC10	Definitions	J.A. Goetz	Frank Jay
SCC11	Graphic Symbols & Designations	C.R. Muller	Fred Huber
SCC14	Quantities, Units & Letter Symbols	B.B. Barrow	Fred Huber
SCC18	National Fire Protection Association Standards	R.L. Simpson	Fred Huber
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October 10, 1986

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Pittsburgh, PA 15802

J. D. Borst
Westinghouse Electric Corp.
PO Box 883
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Subject: Liaison Report to the Performance
Characteristics Subcommittee

Report: Liaison to IEEE Surge Protective Devices Committee's
Oil-Immersed Surge Arrester Task Group of Working
Group 3.3.10

This Oil-Immersed Surge Arrester Task Group met October 1, 1986 in Seattle. I attended as the Transformer Committee's liaison to this Task Group. The subject of the meeting was the development of proposed design tests for this new application of gapless zinc oxide distribution arresters. Most of the meeting was occupied with your liaison presenting his views on the concerns of transformer manufacturers and users on desirable design tests to address compatibility and safety concerns.

In reference to compatibility, the major concerns are assurance that the under-oil arrester will not limit the loadability of the transformer nor the transformer's insulation system and not limit the protective effectiveness of the arrester. One possibility is an adoption of functional life test C57.100 with the provision that the test be performed with the addition of the arrester mounted and connected during the test. The other possibility is that the transformer manufacturer perform his normal tests that assure compatibility of accessories in the oil-filled transformer environment.

In regard to safety, the primary concern is the consequences of failure of the arrester within the transformer. One possibility is a test added to the recently adopted C57.20 Appendix "Design Tests for Fault Current Capability of Overhead Distribution Transformer Enclosures". The new test would presumably be similar to the present 1" arc tests or the tests with internal fusible elements, except that an under-oil arrester would be failed by deliberate low frequency overvoltage, or preliminary damage of the arrester by overvoltage with a few amperes of available current, then application of maximum continuous overvoltage with full available fault current.

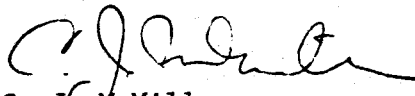
DA Yannucci/JD Borst
October 10, 1986
Page 2

The purpose will be to demonstrate the probable maximum symmetric available current at which cover retention can be assured. Another question is whether the arrester should be in an open-circuit or short-circuited mode after failure.

Since most of the members of the task group are not familiar with transformers, the group requested that the Transformer Committee take the lead in developing design tests addressing these two concerns. I agreed to transmit their request to the Transformer Committee and notify the Task Group of our decision.

There may be a question of scope between the Transformer Committee and the NEMA C57.12.20 Technical Committee in regard to the proposed addition to the fault current capability test, since the latter committee developed that test. In regard to compatibility tests for accessories within the oil-filled transformer environment, I am not aware of any existing ANSI or IEEE standards tests directly addressing that subject. I believe that it has been left to the transformer manufacturer to develop his own policy and tests. I request that the Transformer Committee make a decision on its response to the SPD Committee before its next meeting.

The next meeting of the SPD Task Group is scheduled for April 1987 in New Orleans.


C. J. McMillen
Liaison to SPD Committee's
Task Group on Under-Oil Arresters

mc/1010-2

FALL 1986 REPORT OF
ASC C57 COMMITTEE
ON
TRANSFORMERS, REGULATORS AND REACTORS

Item No.	Project of Standard Designation	Title/Description	Year of last Revision/ Reaffirmation	Year Due Next Revision Reaffirmation	Comments
1	C57.12.00	General requirements for liquid-immersed distribution, power, and regulating transformers	1980	1986	Balloting in Main Committee
2	C57.12.01	General requirements for dry-type distribution and power transformers	1983	1988	Balloting in IEEE Transformer Committee
3	C57.12.10	Requirements for transformers 230,000 volts and below, 833/958-833/10 417 kVA single-phase 750/862-60,000/80,000/100,000 kVA three phase, including supplements	1986	1991	Balloting in Main Committee
4	C57.12.10a	Supplement to requirements for transformers 23,000 volts and below 833/958 through 833/10417 kVA single-phase and 750/862 through 60,000/80,000/100,000 kVA three-phase			To be incorporated in new C57.12.10. Once this is done, the standard shall exist only as part of the new document.
5	C57.12.11	Guide for installation of oil-immersed transformers (10 MVA and larger, 69-287 kV rating)	1980	1986	Revision in progress.
6	C57.12.12	Guide for installation of oil-immersed EHV transformers 345 kV and above.	1980	1986	Revision in progress
7	C57.12.13	Conformance requirements for liquid-filled transformers used in unit installations, including unit substations	1982	1987	
8	C57.12.20	Requirements for overhead-type distribution transformer, 500 kVA & smaller: High-Voltage, 67 000 Volts and below; Low-Voltage, 15 000 Volts and below.	1981	1986	Balloting in main committee

ATTACHMENT "E"

FALL 1986 REPORT OF
ASC C57 COMMITTEE
ON
TRANSFORMERS, REGULATORS & REACTORS

Item No.	Project or Standard Designation	Title/Description	Year of Last Revision/Reaffirmation	Year Due Next Revision/Reaffirmation	Comments
9	C57.12.21	Requirements for pad-mounted, compartmental-type, self-cooled, single-phase distribution transformers with high-voltage bushings; High-voltage, 34 500 GrdY/19 920 volts and below; Low-voltage, 240/120 Volts; 167 kVA & smaller	1980	1985	In process of being withdrawn due to procedural errors
10	C57.12.22	Requirements for pad-mounted, compartmental-type, self-cooled, three-phase distribution transformers with high-voltage bushings; High-voltage, 34 500 GrdY/19 920 volts and below; 2500 kVA & smaller	1980	1986	Revision in progress
11	C57.12.23	Standard for Transformers-Underground-type, self-cooled, single-phase distribution transformers with separable insulated high-voltage connectors; High-voltage, 24 940 GrdY/14 400 V and below; Low-voltage, 240/120 V, 167 kVA and Smaller	1985	1990	Published early 1986
12	C57.12.24	Requirements for underground-type three-phase distribution transformers, 2500 kVA & smaller; High-voltage 24 940 GrdY/14 400 Volts and below; Low-voltage 480 volts & below	1982	1987	A working Group of the C57.12.4 Subcommittee is working on the revision
13	C57.12.25	Requirements for pad-mounted, compartmental-type, self-cooled, single-phase distribution transformers with separable insulated high-voltage connectors; High-voltage, 35 500 GrdY/19 920 Volts & below; Low-voltage, 240/120 Volts; 167 kVA & smaller	1981	1986	Revision in progress
14	C57.12.26	Requirements for pad-mounted, compartmental-type, self-cooled, three-phase distribution transformers for use with separable insulated high-voltage connectors; High-voltage, 24 940 GrdY/14 400 Volts & below; 2500 kVA & smaller	1985	1990	Publication expected Fall 1986

FALL 1986 REPORT OF
ASC C57 COMMITTEE
ON
TRANSFORMERS, REGULATORS & REACTORS

Item No.	Project or Standard Designation	Title/Description	Year of Last Revision/Reaffirmation	Year Due Next Revision/Reaffirmation	Comments
15	C57.12.27	Conformance requirements for liquid-filled distribution transformers used in pad-mounted installations, including unit substations	1982	1987	
16	C57/C37 Cab. Int.	New standard covering coatings, security & labeling of pad-mounted equipment.	New Standard	---	Balloting in C57 and C37 Main Committees
17	C57/C37 Cab. Int. Severe Env.	New standard for cabinet integrity when exposure to severe environmental conditions is expected.	New Standard		Development in progress
18	C57.12.30	Requirements for load-tap-changing transformers 230 000 Volts & below, 3750/4687 through 60 000/80 000/100 000 kVA, three-phase	See listing for Item #3		Expected date of submittal 1986 as part of C57.12.10.
19	C57.12.40	Requirements for Secondary Network Transformers, Subway and Vault Types (liquid immersed)	1982	1987	
20	C57.12.50	Requirements for ventilated dry-type distribution transformers, 1 to 500 kVA, single-phase, and 15 to to 500 kVA, three-phase, with high-voltage 601 to 34 500 volts, low-voltage 120 to 600 volts	1981	1986	Balloting in 8-ST for reaffirmation
21	C57.12.51	Requirements for ventilated dry-type power transformers, 501 kVA & larger, three-phase, with high-voltage 601 to 34 500 volts, low-voltage 208Y/120 to 4160 volts	1981	1986	Balloting in 8-ST for reaffirmation
22	C57.12.52	Requirements for sealed dry-type power transformers, 501 kVA & larger, three-phase, with high-voltage 601 to 34 500 volts, low-voltage 208Y/120 to 4160 volts	1981	1986	Balloting in 8-ST for reaffirmation
23	C57.12.53	Requirements for dry-type, underground-type single-phase distribution transformers with separable insulated high-voltage 24 940 GrdY/14 400 volts and below; low-voltage 240/120 volts			
24	C57.12.54	Requirements for dry-type, underground-type, three-phase distribution transformers, 2500 kVA & smaller; High-voltage 24 940 GrdY/14 400 volts & below; Low-voltage 480 volts & below			

FALL 1985 REPORT OF
ASC C57 COMMITTEE
ON
TRANSFORMERS, REGULATORS & REACTORS

Item No.	Project or Standard Designation	Title/Description	Year of Last Revision/ Reaffirmation	Year Due Next Revision/ Reaffirmation	Comments
25	C57.12.55	Conformance standard for dry-type transformers	1985	1990	Expected to be published in late 1986
26	C57.12.56	Test procedure for thermal evaluation of insulation systems for ventilated dry-type power & distribution transformers	1985	1990	Finally available from ANSI - see current catalog
27	C57.12.57	Requirements for ventilated dry-type network transformers, 2500 kVA & below, three-phase, high-voltage 34 500 volts & below; Low voltage 216Y/125 and 480Y/277 volts	New Standard	----	Expected to be published in late 1986
28	C57.12.58	Guide for conducting a transient voltage analysis of a dry-type transformer coil	New Standard		Balloting in IEEE Transformer Committee
29	C57.12.59	Dry-type transformer through-fault current duration guide	New Standard		In IEEE Transformer Committee
30	C57.12.60	Standard test procedure for thermal evaluation of insulation systems for cast coil and resin encapsulated power & distribution transformers	New Standard		Balloting in IEEE Transformer Committee
31	C57.12.70	Terminal markings and connections for distribution & power transformers	1978	1983	Balloting in Main Committee
32	C57.12.80	Terminology for power & distribution transformers	1978	1983	Balloting in Main Committee
33	C57.12.90	Test Code for liquid-immersed distribution, power & regulating transformers and Guide for short-circuit testing of distribution & power transformers	1980	1985	Balloting in Main Committee
34	C57.12.91	Test Code for dry-type distribution & power transformers	1979	1984	Balloting in IEEE Transformer Committee
35	C57.13	Requirements for instrument transformers	1978	1983	Balloting in Main Committee
36	C57.13.1	Guide for field testing of relaying current transformers	1981	1986	Balloting in Main Committee
37	C57.13.2	Conformance Test Procedures for Instrument Transformers	1985	1991	Publication in late 1986
38	C57.13.3	Guide for Grounding of Instrument Transformer Secondary Circuits and Cases	1986	1991	Balloting in Main Committee
39	C57.15	Requirements, Terminology & Test Code for Step-voltage & induction-voltage regulators	1968	1973	Balloting in Main Committee
40	C57.16	Requirements for Terminology & Test Code for Current-Limiting reactors	1958	1963	

FALL 1986 REPORT OF
ASC C57 COMMITTEE
ON
TRANSFORMERS, REGULATORS & REACTORS

Item No.	Project or Standard Designation	Title/Description	Year of Last Revision/Reaffirmation	Year Due Next Revision/Reaffirmation	Comments
41	C57.17	Requirements for Arc Furnace Transformers	1971	1976	
42	C57.21	Requirements, Terminology & Test Code for Shunt Reactors over 500 kVA	1982	1987	
43	C57.91	Guide for loading mineral-oil-immersed overhead and pad-mounted distribution transformers rated 500 kVA and less with 65°C or 55°C average winding rise	1981	1986	
44	C57.92	Guide for loading mineral-oil-immersed power transformers up to and including 100 MVA with 55°C or 65°C winding rise	1981	1986	
45	C57.94	Recommended practice for installation, application, operation, and maintenance of dry-type general purpose distribution and power transformers	1982	1987	
46	C57.95	Guide for loading liquid-immersed step-voltage and induction-voltage regulators	1986	1991	
47	C57.96	Guide for loading dry-type distribution & power transformers	1959	1964	Balloting in IEEE Transformer Committee
48	C57.98	Guide for transformer impulse tests	1986	1991	
49	C57.99	Guide for loading dry-type and oil-immersed current-limiting reactors	1965		
50	C57.100	Test procedure for thermal evaluation of oil-immersed distribution transformers	1986	1991	
51	C57.101		1972	1977	Revision being developed by IEEE Transformer Committee.
52	C57.104	Guide for detection and determination of generated gases in oil-immersed transformers and their relation to the serviceability of the equipment	1978	1983	Revision being developed by IEEE Transformer Committee.
53	C57.105	Guide for application of transformer connection in three-phase distribution systems	1978	1983	Revision being developed by IEEE Transformer Committee.
54	C57.106	Guide for acceptance & maintenance of insulating oil in equipment			IEEE Transformer Committee developing standard
55	C57.109	Guide for transformer through-fault-current duration	New Standard 1986	1991	
56	C57.110	Recommended practice for establishing transformer capability when supplying nonsinusoidal load currents	New Standard	1991	Balloting in Main Committee
57	C57.117	Guide for reporting failure data for power transformers and shunt reactors on electric utility power systems	New Standard	1991	Balloting in Main Committee
58	C57.124	Guide for conducting partial discharge tests on dry-type transformers	New Standard		Balloting in IEEE Transformer Committee

ATTACHMENT "F"

REPORT ON TECHNICAL PAPER ACTIVITIES AND Ad Hoc PUBLICATIONS COMMITTEE

This has been a busy period with both the Summer Power Meeting in Mexico City and the T & D Conference in Anaheim, CA being held.

The bare facts are that ten papers were submitted for the SPM; five were accepted and presented; one was referred to the Magnetics Society and four were rejected in accordance with the quota. (More later.) For the T&D meeting, 19 papers were submitted; 12 were accepted and presented (3 sessions of four papers each). were rejected or referred to another Society.

The handling of papers at the T&D Conference requires some careful thought. Basically, it is inferred that they want to present as many papers as possible. In the past, there was a request for more practical papers and the early T&D papers were not judged to be of Transactions quality and were not published in the Transactions. Today, the quota rule does not apply to the T&D Conference; however, every paper presented at the T&D Conference uses up quota pages when they are published in the Transactions. It well may be that there should be a special T&D Transactions issue, paid for out of the T&D Conference receipts.

The session attendance at Mexico City was in the 40's. Many students were in attendance. At the T&D Conference, even though the Transformer sessions were Monday, Wednesday, and Friday (the show ended Thursday), the attendance was excellent (50-100) ! It may even be a message in all of this -- maybe there is a need for some less technical papers at our meetings. This possibility will be discussed at other meetings of the Society.

Papers are still arriving for the 1987 WPM. It appears that this will be a banner year.

Appreciation is due to Bob Veitch and the Subcommittee Chairmen for their efforts in making sure the proper people review the submitted papers. I hope all will give Bob the same cooperation you have given me over the past two years.

The Ad Hoc Publications Committee has just about finished the new Publications Guides. There has been a great deal of discussion on how we can better handle the quota issue. At the present time, the Chairman of the Technical Council reviews the number of papers and pages submitted and sets a quota on the number of papers which can be presented at the SPM and WPM by each committee. If we get six outstanding papers for a meeting we can only present three! For some meetings, it is a simple chore to select the best 50%. At other meetings, it is almost impossible. The goal was to present only the best papers; but it doesn't always work. Presently we're looking at an annual or a bi-annual quota and a process of borrowing slots from other committees. This would require a broker of some type to keep up with the interchanges and pacify new papers chairmen who find their predecessor has given away all of his upcoming slots. The challenge of this office continues.

Dlin Compton, 5 October, 1986

APPENDIX "B"
MEETING MINUTES

Audible Sound and Vibration Subcommittee
Pittsburgh, Pennsylvania
October 14, 1986

The Subcommittee was convened by Lennart Swenson at 10:00 AM, October 14, 1986.

The following were present:

<u>Members</u>	<u>Guests</u>
E.H. Arjeski	O. Compton
R. Bancroft	T. Freyhult
R.S. Girgis	J. Grimes
R.L. Grubb	R.R. Hayes
R.G. Jacobsen	J. Hupp
H. Johnson	E. Koenig
J.W. McGill	S. Lindgren
W.J. McNutt	C. Moore
J.M. Pollitt	K. Papp
L.A. Swenson	F. Perri
	G.J. Rutter

Minutes of the last meeting in Little Rock, April 8, 1986, were reviewed and approved.

Additional comments were made on the latest version of the revisions to ANSI C57.12.90. A motion was made to retain the sound pressure measurements. Seconded and approved by voice vote.

Other comments made at the meeting included:

Use of Type I sound level meters should be an optional requirement. Not all manufacturers have Type I meters available, and a Type II meter may be sufficiently accurate.

Sound power calculation should not be based on 1/3 octave band measurements. One suggestion was to calculate sound power at specific frequencies.

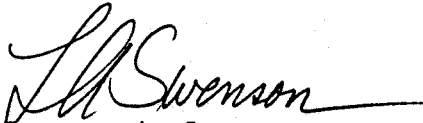
Use the new ANSI style guide.

Harmonize with IEC standards.

The standards revision will be modified and issued as Draft No. 3.

The transformer noise seminar schedule for the Spring 1987 meeting has been postponed to the Fall 1987 meeting in New Orleans. The seminar is planned to consist of four parts with persons listed tentatively assigned:

NEMA TR1 history and application - Bill McNutt
Sound Pressure vs Sound Power - Allen Teplitzky
European Experience - Wolfgang Lampe and J. Gerth
Frequency Analysis - Ramsis Girgis



Lennart A. Swenson
Secretary, Audible Sound and Vibration Subcommittee

(ENT-2167h)

APPENDIX "C"

BUSHING SUBCOMMITTEE

Report to the Transformers Committee

The bushing subcommittee met on Tuesday, October 14, 1986 with 11 members and 15 guests present. Since the last meeting, three members have resigned from the subcommittee and Doug Short, of Short, Vaudry and Associates, Ltd., Kingston, Ontario, has joined the committee. Fred Elliot has replaced Ed Yasuda as the representative for Bonneville Power. This brings the current membership of the committee to 22.

A report was given by the Working Group on the Bushing Application Guide by Acting Chairman Wagenaar. The working group held its initial meeting on Tuesday morning with six members and nine guests present. A brief history was given on the work which has already been done by the bushing subcommittee and C76 on the application of bushings. This work included P757, Guide for Loading Power Apparatus Bushings, which was developed by John Easley's working group on this subject. It was then reported that P800, Bushing Application Guide, could not be published as an IEEE document at this time because portions of it had been developed by C76 before that committee was dissolved and neither the IEEE Standards Board nor the Transformers Committee had approved these portions. In other words, the entire P800 document would have to be balloted within the Transformers Committee and approved by the IEEE Standards Board. The first action of the new working group was to recommend that P757, which was a major portion of P800 and had been approved by both the Transformers Committee and the IEEE Standards Board, be published by itself. This recommendation was accepted by the bushing subcommittee. A letter requesting publication of P757 will be submitted to IEEE Headquarters. The letter will include several editorial errors which had been uncovered since P757 was approved.

In other action of the working group, the table of contents of P800 was reviewed to determine whether additional items were required and the priority of these and other unfinished items. One suggestion brought forth was that the guide should also include maintenance of bushings. These items will be reviewed further by the working group members before the next meeting.

In other action of the Bushing Subcommittee, the results of the P21/d7 ballot within the subcommittee and the Transformers Committee were reported as follow:

	Transformers Committee	Bushing Subcommittee
Ballots sent out	108	24
Ballots Returned	64 (59%)	15 (62.5%)
Affirmative	42 (70%)	6 (43%)
Affirmative w/comment	14 (23%)	6 (43%)
Negative	4 (7%)	2 (14%)
Not Voting	4	1

The subcommittee started its review of the numerous comments on the ballot. Several of the comments involved the new test procedure for oil-impregnated paper capacitance-graded bushings as discussed at the Little Rock meeting. The subcommittee agreed upon the following modified procedure and RIV and pC limits:

1. Measure RIV or PD at 1.5 times maximum line to ground voltage - 10 uV or 10 pC maximum.
2. Perform the one-minute dry withstand test, no RIV or PD measurements required.
3. Repeat RIV or PD measurement at 1.5 times maximum line to ground voltage - 10 uV or 10 pC maximum.

The limits for uV and pC will be submitted to the NEMA JSC on Power Apparatus Bushings for their concurrence.

The subcommittee reviewed about 25% of the remaining comments from P21/d7. One of these comments suggested that bushings for distribution class equipment be included in the scope of IEEE 21. It is not possible to do this at the present time since the scope of the subcommittee only includes bushings for power equipment. We would probably elect not to put bushings for distribution equipment in IEEE 21 and 24 because of different requirements for testing, dimensions, etc., but this discussion leads to a question for the Transformers Committee: Should the scope of the bushing subcommittee be expanded to include bushings for distribution equipment? It was suggested at the Transformers Committee meeting that 1) this question should be investigated further with respect to distribution and lower voltage power apparatus and 2) there are many manufacturers for these types of bushings and it may be difficult to achieve agreement.

L.B. Wagenaar, Chairman
Bushing Subcommittee

APPENDIX "D"

MEETING MINUTES
Dielectric Test Subcommittee
Pittsburgh, PA
October 14, 1986

L. S. McCormick, Chairman

<u>Membership of Record</u>	<u>Attendance Status</u>	
	<u>Present</u>	<u>Absent</u>
Allan, D. J.		X
Allustiarti, R.	X	
Alton, R. J.		X
Arjeski, E. H.		X
Arnold, S. W.		X
Barnard, D. A.	X	
Bellaschi, P. L.		X
Bergeron, J. J.	X	
Bonnucchi, J. V.		X
Brown, C. V.	X	
Chitwood, E.		X
Cook, F. W., Sr.		X
Corkran, J. L.	X	
Douglas, D. H.		X
Douglass, J. D.	X	
Duckett, D. A.	X	
Dutton, J. C.	X	
Fallon, D. J.	X	
Fischer, H. G.	X	
Fleeman, J. A.	X	
Frydman, M.	X	
Hoesel, C.	X	
Honey, C. C.		X
Hurty, C.		X
Iijima, Y. P.	X	
Iliff, G. W.	X	
Keller, O.		X
Kennedy, W. N.	X	
Lee, R. E.	X	
Light, H. F.	X	
Matthews, J. W.	X	
McAlpin, J. T.	X	(Rep. by R. Fryer)
McCormick, L. S.	X	
McCrae, G. C.		X
McMillen, C. J.	X	
Mehta, S. P.	X	
Miller, C. K.		X
Minkwitz, R. E.	X	
Moore, H. R.	X	
Moser, H. P.	X	(Rep. by M. Franchek)
Musil, R. J.		X

<u>Membership of Record</u>	<u>Attendance Status</u>	
	<u>Present</u>	<u>Absent</u>
Osborn, S. H.		X
Perco, D. D.	X	(Rep. by P. V. Burke)
Puri, J.	X	
Robbins, C. A.	X	
Saxon, W. E.	X	
Shenoy, V.	X	(Rep. by V. Cepon)
Stein, W. W.	X	
Stensland, L. R.	X	
Traub, T. P.		X
Vaillancourt, G.	X	
Veitch, R. A.	X	
Wagenaar, L. B.	X	
Whearty, R. J.		X
Wurdak, A. C.		X
Yannucci, D. A.		X

GUESTS

Antweiler, J.	Lindgren, S.
Arnold, J. C.	Linsley, K. R.
Aubin, J.	Mitelman, M. I.
Badagliacca, A.	Moon, J. L.
Basel, D.	Moore, S.
Binder, W. B.	Norton, E. T.
Blackmer, J. D.	Oklu, S.
Boettger, W. E.	Patel, B. K.
Boggavarapu, R. L.	Payne, D. C.
Borst, J. D.	Patterson, W.
Brazier, D.	Reitter, G. J.
Brown, R. D.	Schauffler, G.
Carter, W. J.	Seitlinger, W. P.
Cepon, V.	Sharp, M.
Edwards, E. C.	Smith, S. D.
Franchek, M. A.	Strangas, E. G.
Frazer, R. H.	Takach, D. S.
Fryer, R.	Walters, T. L.
Garcia, R.	Walther, H. B.
Gearhart, R. E.	Wilks, A. L.
Guris, G. Z.	Windisch, H. J.
Harlow, J. H.	Wrenn, W. E.
Henning, W.	Young, F. N.
Hollister, R.	
Howells, E.	
Kappeler, C. P.	
Kennedy, S. P.	
Klein, G.	

MEETING MINUTES

DIELECTRIC TEST SUBCOMMITTEE
October 14, 1986
Westin William Penn Hotel - Pittsburgh, PA

The Subcommittee met at 10:00 a.m. with 32 members and 52 guests in attendance.

The minutes of the previous meeting in Little Rock, Arkansas, were approved as submitted.

After the introduction of the attendees and the chairman's remarks about the previous night's ADSUBCOM meeting, the Working Group chairmen reported as follows:

Working Group on Revision of Dielectric Tests - John Bergeron

The Working Group met at 3:05 p.m. with 23 members and 21 guests present. Vis Thenappan of ASEA Electric was added to the Working Group Roster.

William Kennedy reported on the Task Force on Revision of Dielectric Tests of Shunt Reactors. They met with 8 members and 9 guests present. The Task Force discussed Draft 3 of their document and good progress was made. Areas discussed included:

1. One Hour, Low Frequency Overvoltage Test - The proposal for the three single phase one hour tests as an alternate to a three phase test was accepted. It was also decided to eliminate the phrase "to the users satisfaction" as ambiguous and inappropriate for this purpose.
2. Temperature Section (10.3.1.4.2) - It was clarified that the intent of this section was to allow the manufacturer to perform tests at either operating or ambient temperature depending on its condition at the time. The wording does match the present standard so no change will be needed.
3. Field Testing (Section 10.3.1.6) - It was decided to eliminate references to field testing as these tests are much more difficult to perform than transformer tests and apparently are not done.
4. The section on duration, frequency, and connections will be reworded.

5. Full Wave Tests - There was concern that the requirement that a generator applying a waveshape to a shunt reactor have a capacitance of .011 uf was perhaps outdated. Manufacturer representatives will verify this value with their factories to see if higher values are justified to reflect higher MVAR on KV units.
6. Regarding Windings of Very Low Impedance - the impulse test guide will be reviewed and manufacturers will check to see if the procedure referring to insertion of a resistor in the grounded end of the winding could be deleted.

At the Working Group meeting, the Task Force chairman was requested to poll his members to determine if a Working Group ballot would be appropriate before the next meeting for the purpose of gaining additional input to their deliberations.

Jim Douglas reported on the meeting of the Task Force on External Clearance Requirements. They reviewed draft 3 of their document entitled "Minimum External Clearances Between Live Parts of Different Phases of the Same Voltages (345 and 500 KV nominal system voltages)". This draft was balloted within the task force and was a successful ballot with unanimous approval.

The Task Force discussed the question of phase to phase dielectric tests and referred that matter back to the Working Group with a suggestion that the Working Group provide a revision to C57.12.90, paragraph 10.6, in which a detailed procedure for making phase to phase switching impulse tests would be incorporated. L. S. McCormick questioned if users really were interested in such a test. Jim Douglas indicated that he had only seen one or two requests to date. Charlie Honey suggested that this should be explored. There was question as to what magnitude spike or enhancement was equivalent to a switching surge; i.e., 1.3 multiplier, or 1.5 for a corona free situation, or some other value. It was asked if other users were interested. B. Patel indicated that if something was actually written and made available more users would specify it.

Other users indicated some interest in the subject. Charlie Honey volunteered to put together some data he had which would help us get a handle on the interrelationships of the equivalencies of these waves. Ontario Hydro indicated that they were performing phase to phase switching surge tests on some transformers to prove external clearances and internal insulation. There was question regarding the allowable split between phases. Vic Shenoy will be contacted by Jim Douglas to provide data on this. Users were asked to review their system needs and be prepared to discuss this matter. To assist in this the chairman will forward Charlie Honey's data and his insulation coordination paper to the Working Group as soon as it is received from him. Users were also

asked to look at their transformers to determine if internal, phase to phase dielectric failures were a problem. This will be an agenda item for discussion at the next Working Group meeting.

Continuing on, Jim Douglas also reported on their clearance discussions at 230 kV. The Task Force agreed that the minimum external clearance between live parts of different phases at 230 kV should be 70 inches except for full BIL (1050 kV BIL) transformers, where 84 inches is needed. George Iliff questioned the full BIL as the new revisions of C57.12.00 and 12.90 only go up to 900 kV BIL for 230 kV. It was agreed that in the interest of simplicity, full BIL need not be included. The Task Force also agreed to study clearances for 161, 138, and 115 kV, but not to address lower rated transformers. A fourth draft with this information will be developed and balloted prior to the preparation of an addendum to the standards to incorporate this information.

The next agenda item was C57.98, the Impulse Test Guide, which is now available for purchase. Several areas in need of supplementation were discussed. The first was the incorporation of digital techniques. Thomas Freyhult of ASEA Electric has volunteered to draft language covering this technique. He made a brief presentation on possible content of this section, which spurred heavy discussion. He proposes that the section include 1) information pertinent to the selection of a digitizer with suitable response, sensitivity, and accuracy with adequate vertical resolution and frequency sensitivity and 2) The manner(s) in which these results could be displayed or messaged electronically. There was discussion of the need to do this, of why digital at all. It was pointed out that it is potentially easier and less costly but could be used to amplify small differences in waves to the point where no transformer would ever pass testing. It was decided that it would be appropriate to proceed with the first item but there was much concern with the potential problems which may result from manner of display of results. It was agreed to pursue a course which would produce a digitized waveform which could be outputted to produce an analog waveform of a quality equal to that currently available from the oscilloscopes.

It was also noted that several volunteers, including Sam Metha, B. P. Patel, George Iliff, Dennis Allen, and Thomas Freyhult, have agreed to work on a task force dedicated to the revision of this guide. We are actively pursuing someone to write a switching surge test section and will be looking for a task force chairman sometime in the future.

Under New Business: L. S. McCormick announced that the C57.12.00 and 12.90 revisions were being balloted within ANSI C57. Ballots are due back in a few weeks and it looks like we will get these published shortly. L. S. McCormick also informed us of two problems with the old table 14 (new table 16) of 12.00 which specifies routine and design and

optional tests. First we need to remove from a note, reference to lightning impulse tests, since they are now routine for 115 kV and above and secondly a note saying that tests other than routine shall be specified by the user. L. S. has volunteered to rework the table and prepare a working group ballot to cover these problems.

The meeting adjourned at 4:30 p.m.

Working Group for Revision of Dielectric Testing of Distribution Transformers - C. V. Brown

The group met on Monday, 10/13/86, at 1:05 p.m. with 13 members and 15 guests. Mr. Alan L. Wilks and J. Puri requested membership on the Working Group.

Bill Henning, chairman of the Task Force working on adoption of a routine impulse test for distribution transformers, distributed draft 4 of the proposed text. The proposal has been rewritten as an addition to C57.12.90 instead of being a free standing supplement. The proposed addition contains about 1000 words while the supplement contained 1500 words. Draft 4 contains some different technology to conform to the present standard and to accommodate a negative ballot on the previous draft. Draft 4 will be editorially revised to remove some redundant phrases and to change "production line test" to "routine impulse test" for distribution transformers. The revised draft will be simultaneously balloted in the working group and the Dielectric Test Subcommittee. A new PAR has been requested to add the test to C57.12.90.

A proposed meeting on low side surge withstand requirements for distribution transformers was discussed. The summary of a questionnaire, addressed to those who had previously indicated interest in the topic, indicated that most preferred to hold this meeting following a regular Transformers Committee meeting. The next available date would be at the May, 1987, meeting in Ft. Lauderdale. Bob Lee has volunteered to be chairman of the Task Force to study this problem. Meeting adjourned at 2:10 p.m.

Working Group for Dielectric Tests for HVDC Stressed Transformers and Reactors - Bill Kennedy

Members Present:

D. J. Allan - GEC Power Transformers
H. G. Fisher - EHV. Weidmann
K. R. Highton - Consultant
C. Hurty - Bechtel
William Kennedy - General Electric
W. W. Stein - Transformatoren Union

Members Absent:

J. Gerth - Brown Boveri
D. A. Gillies - Consultant
W. Lampe - ASEA
E. T. Norton - Consultant
S. Olelu - L. A. Dept. of Water and Power
E. J. Yasuda - Bonneville Power Administration

The Working Group met on Monday at 8:00 a.m. with 6 members present.

We reviewed a preliminary chart listing HVDC converter systems and comparing their actual test voltages with recommended test levels calculated from CIGRE and IEEE formula. This comparison was prompted by a request from a utility representative who was reluctant to accept the lower one hour DC levels proposed by IEEE without adequate proof that they are realistic. This initial comparison shows three out of seven systems examined where the proposed IEEE one hour test equals or exceeds that actually tested. We have requested additional data on other systems to continue the study.

A considerable amount of time was devoted to reviewing the work of the CIGRE joint working group SC 12/14.10 on HVDC converter transformers. Topics discussed included:

1. Individual AC and DC dielectric tests versus combined tests. This question has apparently been of interest since DC systems were being developed in the 70's. I've volunteered to review the published data and report back to the CIGRE working group. Discussions within our position that the separate tests performed at levels recommend in our recent IEEE paper provide realistic stress levels with sufficient margin.
2. Specifications List. One of the documents presently being developed by the CIGRE Working Group is an extensive list of the specifications uniquely required by converter transformers. These specifications cover a broad list of subjects including harmonic levels, noise levels, and testing of losses. We are in excellent agreement with this list, and it was noted that there is a definite need for a specification which would provide guidance to the specifier and guide a purchaser.

We felt that the Working Group would like to cover a wider range of topics than that covered by the Dielectrics Subcommittee, and that we would be most effective as a subcommittee. I'm very pleased to report that at the Adcom meeting this suggestion was approved (subject to IEEE approval) with the title "HVDC Converter Transformer and Smoothing Reactor Subcommittee".

Working Group on Partial Discharge Tests for Transformers - H. R. Moore

The Working Group met at 8:00 a.m. on October 14, 1986, with 12 members and 18 guests present.

The minutes of the Little Rock meeting were approved as written.

Mr. G. Vaillancourt, chairman of the Task Force for Measurement of Apparent Charge, reported on the task force meeting held on October 13. The results of the ballot in the Transformer Committee on the seventh draft of the Trial Use Guide for Partial Discharge Measurement in Power Transformers and Shunt Reactors were reviewed.

The results of the ballot were as follows:

Approved	75
Approved with Comments	10
Not Returning Ballots	17
Not Approved	2
Not Voting	3
	<hr/>
	107

The comments made were primarily for clarification purposes. All of the comments were resolved by making a number of clarification and editorial changes. The two "Not Approved" votes have been resolved so that the Trial Use Guide was approved by the Transformer Committee

There was a question on whether the scope of the Trial Use Guide included dry type as well as oil immersed. This matter was brought up at the Working Group meeting, and all attendees understood that the document applied to oil immersed only. The title will now state oil filled for clarification.

After making the corrections, the eighth draft of the Trial Use Guide will be submitted to the Standards Board for approval.

The Task Force will remain active and will collect and analyze the partial discharge test data.

Mr. E. Howells, chairman of the Task Force for Acoustic Detection of Partial Discharges, reported on their task force meeting held on October 13. The sixth draft of the proposed Guide for Acoustic Detection of Partial Discharges has been completed. It is now being balloted within the Working Group, and results will be available at the next Working Group meeting. This guide applies to detection only, and work on a guide for location of partial discharges utilizing acoustic detectors will be initiated at a later date.

At the request of the Working Group on Revision of Dielectric Tests, the Working Group will investigate the need for partial discharge measurements on low voltage terminals of autotransformers for voltages less than 115 kV. The chairman will appoint a group to determine the interest in such measurements.

The Working Group discussed the state of RIV measurements, and it appears that there is general acceptance of present standards. There is no interest in revisions to the RIV method at this time.

There being no other business brought before the Working Group, it was adjourned at 8:45 a.m.

The chairman reported to the Subcommittee that Dr. Lampe, who intended to give a report on the acceptance and use of the IEC Dielectric Standards in Europe, was unable to attend this meeting. It is hoped that he can present this at some future meeting.

The chairman then announced that his resignation as chairman had been accepted and that a replacement would be announced before the spring meeting.

There being no other business brought before the group, the meeting was adjourned.

L. S. McCormick

L. S. McCormick
Chairman

LSM/emc

*Dielectric tests SC to look at failure of HV current
Transformers.*

APPENDIX "E"

DRY-TYPE TRANSFORMERS SUBCOMMITTEE
MINUTES OF OCTOBER 15, 1986 MEETING
PITTSBURGH, PA.

The Dry-Type Transformer Subcommittee met at 1:50 p.m. on October 14, 1986 in the William Penn Hotel, Pittsburgh with 18 members and 16 guests present. Following introduction of members and guests and opening remarks by the Chairman, the minutes of the previous meeting were submitted for approval. An error was reported on page 2 of the Little Rock meeting minutes. On line 8, the temperature values should be 155°C and 185°C and line 9 should read 150°C and 180°C. After correction of this error the minutes were approved.

Working Group Reports

- 1.0 Working Group on Insulation Requirements for Specialty Transformers - Alan Iverson, Chairman.

This Working Group met on Monday, October 14, 1986 with eight members and eight guests present.

- 1.1 The mission of this Working Group is the revision and reaffirmation of IEEE Std. #259. This standard has been granted an extension beyond its 1985 expiration date. A project authorization P259 has been approved.

- 1.2 The process was started with a Working Group ballot of the present standard. One ballot was approved, three were approved with comments and one disapproved.

A discussion of the ballots followed with the following action steps:

1.2.1 Review preliminary dielectric proof tests in light of current product standards.

1.2.2 Incorporate new language to allow use of variable temperature exposure periods, thus, providing more uniform environmental stresses for all aging temperatures.

1.2.3 Propose new guidelines for the construction of transformerette models.

- 1.3 Mr. George Zquris volunteered to conduct a survey of manufacturers and material suppliers to determine the extent of the use of IEEE Std. #259 and to determine the types of life test models in current use.

- 1.4 The Chairman proposes to ballot a new draft with the proposed revisions.

- 2.0 Working Group on Standards for Dry Type Transformers Incorporating Solid Cast and Resin Encapsulated Coils - Egon Koenig, Chairman.

2.1 This Working Group met on Monday, October 14, with 19 members and 15 guests present. A revised draft of C57.12.01 incorporating changes appropriate for cast coil dry type transformers was balloted in the Transformer Committee. Results of the ballot were:

110 mailed
42 approved
11 approved with comment
4 unapproved
12 no vote and 38 not returned

Response on the ballot thus far is 66%.

2.2 Most of the negative votes and comments on affirmative votes concerned the original standard rather than the revisions relating to cast coils. One negative vote concerned having a partial discharge test listed as routine. The Chairman appointed a Task Force consisting of W. W. Stein, D. Barnard, and S. Antalis to study and make recommendations on this issue.

Another negative vote related to the symbols used in cooling classifications such as AA, AFA, etc. The objector proposed that a separate cooling classification be established for cast coil transformers.

2.3 Other comments were mainly applicable to the original standard and involved questions relating to the following:

- a. Harmonic distortion limits in defining rated supply voltages and load currents. Mr. Dave Barnard volunteered to review this and report back to the Chairman.
- b. Positive wave impulse voltages - particularly above 110 kV BIL.
- c. The rating data section of the standard as being inappropriate to the purpose of the standard.
- d. Inadequate agreement with IEC standards.
- e. Use of letter "K" as in Kelvin to designate temperature rise or temperature difference instead of °C. (The use of "K" is an IEC convention.)
- f. Hot spot temperature allowances.
- g. Numbers of permissible BIL ratings for each voltage class.
- h. Loss tolerance deviation from specified losses.

2.4 Working Group spent remainder of meeting discussing the above negative votes and comments. Meeting adjourned.

3.0 Working Group on revision of Dry Type Transformer Loading Guide C57.96 - Bill Mutschler, Chairman.

This Working Group met with 12 members and 16 guests present.

3.1 Draft #10 of C57.96 was sent to the Transformer Committee on September 13, 1986. To date, 61 ballots have been returned with the following results.

Affirmative	44
Negative	4
Not Voting	13

Proposed editorial changes were discussed and adopted for inclusion in Draft 10a.

3.2 Negative votes were reviewed and considered to be editorial in nature. Negative voters will be contacted on this basis and their approval requested.

3.3 Final draft will contain two additional tables for short time overloads for 20°C and 40°C ambients. Tables will also include maximum load cycle temperatures. Reference to the Arrhenius curve will be included in the foreword. If approval of negative ballots is obtained and the percentage of returned ballots meet requirements, Draft 10a will be forwarded to the Standards Board. Meeting adjourned.

4.0 Working Group on Dry Type Transformer Dielectric Problems - Don Kline, Chairman.

This Working Group met on October 15, with 11 members and 20 guests present.

Don Kline reported on the results of a Subcommittee ballot of D/1 "Guide to Partial Discharge Tests" (C57.124). Results are 10 affirmative, three affirmative with comments, two negative, and two not voting.

4.1 Review of comments resulted in several revisions to test circuits.

After reviewing a letter from G. Vaillancourt, the Working Group decided that the guide format should follow the corresponding liquid transformer guide. This will be incorporated in a new draft. Meeting adjourned.

5.0 Working Group on Standard Test Procedures for Thermal Evaluation of Insulation Systems for Solid Cast and Resin Encapsulated Dry Type Transformers - George Bowers, Chairman.

This Working Group met on October 15, with 10 members and 17 guests present.

5.1 The Chairman reported that D/6 of the above standard will be balloted in the Subcommittee soon, and if successful, will be forwarded to the Transformers Committee for ballot. The companion document for conventional dry type transformers, C57.12.56, should be available from the printers in the near future.

6.0 Task Force on Flammability of Dry Type Insulation Systems - George Bowers, Chairman.

This Task Force met as a continuation of the Thermal Evaluation Working Group with 26 people in attendance.

6.1 The Chairman announced that in accordance with the agreement reached in the previous meeting, the purpose of the Task Force would be educational in nature. Expertise in flammability is external to the Task Force. Task Force will report on known progress in the field.

6.2 A fire risk assessment research project is being started with NFPA (National Fire Prevention Association) funding of \$750,000. Organization and objectives not developed as yet.

It was reported that the State of New York will require toxicity data on plastic pipe and conduit to be filed by October, 1987 using the University of Pittsburgh toxicity tests. Plastic wire and cable insulation toxicity data will be required by October, 1988.

6.3 The Chairman announced that a bibliography on this subject will be maintained and expanded as references become available.

7.0 Dry Type Reactor Task Force - R. Dudley, Chairman.

This Task Force is concerned with dry type current limiting and shunt reactors. The Task Force believes it would accomplish its task best by preparing documents and sections of documents which could be incorporated into the present reactor standards.

- 7.1 The Task Force met on October 17 with four members and three guests present. The Chairman submitted revisions to the present document for discussion. One of the key revisions was a table listing routine, design, and other tests relating to dry type reactors. Table 7 in D/3 of C57.21 will become Table 7A for oil immersed shunt reactors and Table 7B for dry type shunt reactors. The Task Force reviewed each test in proposed Table 7B including all standard tests, plus switching surge tests, front of wave tests, audible sound tests, and seismic verification tests.
- 7.2 The Chairman will communicate the results of Task Force revisions to Jack McGill for inclusion in the current drafts of C57.21.
- 8.0 Chairman Uptegraff reported that the Thru-Fault Duration Guide C57.12.59 remains in limbo awaiting approval of the Loading Guide C57.96.

Dry Type Subcommittee meeting adjourned.



E. C. Edwards, Secretary
Dry Type Transformer
Subcommittee

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APPENDIX "F"

REPORT OF INSTRUMENT TRANSFORMERS SUB-COMMITTEE

The Instrument Transformers Sub-Committee met October 14, 1986, in Pittsburgh, PA, at 8:00 a.m. and 1:45 p.m., with 9 members present or represented, and with four guests.

The minutes of the 4/8/86 meeting were approved, with one editorial correction.

The following items were reported:

1. C57.13.2 Conformance Test Procedures for Instrument Transformers is ready for publication.
2. John Reckleff, Chairman of the Joint Working Group on Requirements for Current Transformers for Use With AC High-Voltage Circuit Breakers, reportedly has a new draft for Sub-Committee ballot. Mr. Reckleff anticipates that one more meeting of the Working Group may be required.
3. The C57 ballot on P860, Guide for Grounding of Instrument Transformer Secondary Circuits and Cases, is essentially complete. This material will eventually be published as C57.13.3.
4. The ANSI C12 Committee has balloted a proposed revision of C12.11, Standard for Instrument Transformers for Revenue Metering, 10KV BIL through 350 KV BIL. This material includes dimensional and minimum electrical characteristics for these transformers. Results received are 14 "approved" and 2 "not approved".
5. The ANSI C12 Committee has also balloted proposed revision of the instrument transformer coverage in C12.1 American National Standard Code for Electricity Metering. Results received are 14 "approved", none "not approved".
6. The ballot on P546/D5 Standard Requirements for Instrument Transformers, the complete revision of C57.13, was summarized as follows:

103 ballots sent out
64 approved
9 approved with comments
3 not approved
11 not voting
16 not responding

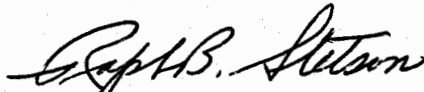
(also 1 not approved from Liaison)

The Sub-Committee reviewed the comments and negative ballots. The major problem is a collection of observations and objections related to insulation test requirements for high voltage instrument transformers. A three-man group was established to propose a resolution of this problem for consideration by the Sub-Committee and subsequent re-ballotting.

AGR may have meeting in New Orleans

Another significant problem, arising from a negative ballot, is a proposed revision of test requirements for short-time mechanical current rating of current transformers. As this rating is often coordinated with circuit breaker withstand ratings, two alternate proposals will be communicated to C37 before re-ballotting.

Respectfully Submitted,



Ralph B. Stetson, Chairman
INSTRUMENT TRANSFORMERS SUB-COMMITTEE

2578E/83

- Dielectric Testing of Instrument Transformers
above 230kV → Dielectric Tests S C

APPENDIX "G"

MEETING MINUTES
INSULATION LIFE SUBCOMMITTEE
WESTIN WILLIAM PENN HOTEL
PITTSBURGH, PENNSYLVANIA
OCTOBER 14, 1986

The Insulation Life Subcommittee meeting was called to order at 1:50 p.m. A total of 49 were in attendance consisting of 19 members and 30 guests.

After the introductions of all in attendance, the minutes of the previous meeting of April 8, 1986, in Little Rock were approved.

The following working groups reported as follows:

WORKING GROUP ON THERMAL EVALUATION OF POWER & DISTRIBUTION TRANSFORMERS

Chairman Al Wurdack reported that they met on Tuesday at 8:00 a.m. with seven working members and 16 guests present.

It was announced that copies of the recently revised Guide for Thermal Evaluation of Distribution Transformers, ANSI C57.100, has been published and is available for purchase.

The meeting then centered on a discussion of the preparation of an initial draft of a Guide for Thermal Evaluation of Power Transformers. Material mailed out to all working members and meeting guests three weeks before the meeting, consisted of portions of EPRI reports dealing with thermal evaluation, testing of model transformers and a list of questions. These were discussed.

A key question as to the desirability to include determining of limitations due to bubbling in the Guide or to concentrate only on the determination of the insulation aging limitation, was discussed at great length. Though it was agreed that bubbling is a very important thermal limitation, it was discerned by a vote of the working group and guests that the guide should only address the aging limitation at this time as does the recently completed guide for Thermal Evaluation of Distribution Transformers. It was also decided that only general guidelines should be included in the guide for design of the transformer models to be tested. Also the scaling techniques to extrapolate the model results to full size transformers will be left up to the manufacturer using the guide.

A task force was established to prepare a scope and initial draft of the proposed new guide. Those volunteering to work on this Task Force are Dave Douglas, Chuck McMillen, Bob Grubb, Bill McNutt and Dean Yannucci.

The extremely valuable reports generated for EPRI in this area by GE and Westinghouse will be used as a basis for this new draft.

The meeting was adjourned at 9:20 a.m.

After this report was given at the Subcommittee meeting there was a brief discussion on the need for this new guide. No one is knocking down doors to have a guide like this prepared at this time. The main incentive for preparing this guide now is to take advantage of this extremely valuable work done by Westinghouse and GE for EPRI before it is forgotten and lost.

In an effort to re-enforce this position, Olin Comptom offered this sage advice, and I quote: "The time to cut the wood is before Winter comes."

WORKING GROUP ON THERMAL TESTS

The second working group to report was that on Thermal Tests chaired by Bob Grubb. He reported that his Working Group met on Monday at 3:05 p.m. with nine working group members and nine guests attending.

The only business before this Working Group at this time is Project P-838, for the preparation of a Guide for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate. The resolution of the negative ballots on Draft 9 were agreed upon at the last meeting. Due to a very busy schedule, Bob Grubb was not able to prepare Draft 10 for the Pittsburgh meeting. Adding to the size of the job was the charge made at the Little Rock meeting to add designated tutorials to the guide.

Volunteers were requested to help in preparation of these tutorials. Ed Norton volunteered to prepare a tutorial on winding hottest spot temperature detection and Bob Grubb consented to write a tutorial explaining the reasoning for the specification of temperature rise tests at 70%, 100% and 125% of rated load. These tutorials will be balloted by the Working Group before the next meeting and before Draft 10 is issued for ballot.

Under old business, an IEEE Working Group position paper on this new guide was discussed and an effort will be made to begin this paper before the next meeting.

Under new business, Bob Grubb indicated that preparation of this new guide has pointed out many deficiencies in thermal test procedures incorporated in ANSI C57.12.90. It was felt that work should begin on revisions to this document soon, especially since IEC is now doing a lot of parallel work in this area. Bob will solicit members for a Task Force to begin this work.

WORKING GROUP ON GUIDES FOR LOADING

The third report given was from the Working Group on Guides for Loading, chaired by Bill Wrenn. He reported that the Working Group met bright and early at 8:00 a.m. on Monday morning with 21 working group members and 23 guests attending.

Jacques Aubin reported on the progress made on revisions of the IEC Loading Guide for Power Transformers. This guide is very near being completed though there are several areas of contention left.

Bill Wrenn reported that the revision of C57.95, the Regulator Loading Guide, has been printed in draft form in the large C57 compilation book that was recently published. C57.95 has not been fully processed as it is a companion document with C57.15 the Regulator Standard, which is slightly behind it in the approval path.

The Working Group then embarked on furthering the process of revising and combining loading guide C57.91, C57.92 and C57.115, which is the new designation for the "trial use" loading guide for transformers above 100 MVA formerly designated P756.

A proposed Table of contents for the new guide, prepared by Bill McNutt, was approved. Sections of this will be parceled out to working members for development.

A spirited discussion was held on areas of revision presented at the Little Rock meeting but not acted upon. These areas of discussion were:

1. Equation Symbol Standardization

An attempt is being made to standardize symbols used in all ANSI Loading Guides and IEC Loading Guides. This effort has been taken up by the AdCom Subcommittee to implement.

2. Modification of the ANSI Equation for Determination of Winding Hottest Spot.

To draw closer to the IEC equation which uses a stray flux factor instead of the ANSI 15C hot spot allowance. The IEC also uses bottom oil temperatures and not the more difficult to measure top oil temperature. Also discussed was the correction factor for change in winding resistance which the IEC is proposing. It was suggested that a Task Force including manufacturers be set up to resolve these proposed revisions.

3. Load Tap Changers

Tom Traub's report, regarding acceptable temperatures on LTC contacts to minimize the tendency to carbonize, was discussed.

4. Cold Temperature Operation

It was agreed that loading tables will be extended to cover temperatures down to -20C and that load pickup at cold temperatures will be addressed.

5. Other Areas That Came Under Discussion Were:

- Loading limitations due to current transformers.
- Directed flow transformers and the proposal to place this information on the nameplate. (It was subsequently decided that a better definition of Directed flow be developed before anything more is done in this area.)

- The questions of whether rectangular coil transformers are covered by the same loading guide as cylindrical coil power transformers or as distribution transformers, which also have rectangular coils.
- Comparison of the variations in Loss-Ratio.

Due to lack of time the meeting was adjourned, and as an indication of the group's enthusiasm, they worked through the coffee break.

Dave Douglas
Chairman of the
Insulation Life Subcommittee



Westinghouse
Electric Corporation

Utility Delivery Systems

Materials & Manufacturing
Technology

469 Sharpsville Avenue
Sharon Pennsylvania 16146-2119 USA
(412) 983 4335

October 24, 1986

TO: IEEE TRANSFORMERS COMMITTEE
Insulating Fluids Subcommittee

FROM: Henry A. Pearce, Chairman

Enclosed is a copy of the minutes of the Subcommittee meeting held
October 13 & 14, 1986 in Pittsburgh, Pennsylvania.

MEMBERS PRESENT

D. Allan	J. Kelly
L. Baranowski	H. Light
G. Bryant	T. Lipscomb
J. Corkran	R. Lowe
D. Crofts	R. Minkwitz
D. Douglas	E. Norton
M. Frydman	T. Orbeck
F. Gryzkiewicz	H. Pearce
J. Haupt	T. Rouse
F. Henrichs	L. Savio
P. Hoeffler	D. Sundin
C. Hoesel	R. Young
B. Hunter	

GUESTS PRESENT

J. Fleeman	American Electric Power
R. Jacobson	Puget Sound Power & Light
H. Walther	Duquesne Light
C. Moore	Consultant

H.A. Pearce, Chairman
Insulating Fluids Subcommittee

HAP.slr

Encl. (2)

IEEE TRANSFORMER COMMITTEE

INSULATING FLUIDS SUBCOMMITTEE

The Insulating Fluids Subcommittee met on Monday and Tuesday, October 13 and 14, 1986 with 26 members and 7 guests present.

1. The minutes of the April meeting in Little Rock, Arkansas were approved as presented.
2. Mr. J.A. Fidinger was removed from membership on the Subcommittee at his request.
3. The Chairman reported that the Guide for Handling and Disposal of Transformer Grade Insulating Liquids Containing PCB's, Project 799, has been approved by the Standards Board and should be issued soon.
4. A PAR has been approved for the Subcommittee to revise and update Guide C57.106, Guide for Acceptance and Maintenance of Insulating Oil in Equipment. It was agreed to begin with a survey to determine which tests are being used and the frequency. Frank Gryszkiewicz of Doble will head up the survey. *Sending out a survey to TX Comm.*
5. Progress is being made on Project C57.104, Gas Guide. After a lengthy discussion it was agreed to rewrite the Sections on Scope and Field Testing. Brian Hunter is chairing this activity. The sampling and testing Sections are complete. Work is progressing on the Interpretation Section and a Task Force led by Leo Savio plans to have a write-up for the Subcommittee to review before the next meeting. They will survey to gather information about gas norms and transformer problems. At the next meeting in Ft. Lauderdale they will present a Seminar on Gas Analysis on Tuesday afternoon.
6. Project C57.121, Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid in Transformers. Ballots on draft 7 were received and the one negative was resolved. Draft 8 will now be prepared for ballot by the Transformer Committee. *Approved*
7. Draft 10 of Project C57.111, Guide for Acceptance and Maintenance of Silicone Fluid in Transformers was balloted by the Subcommittee with three negatives. These were resolved and many editorial changes were made. Draft 11 will now be prepared for submission for ballot to the Transformer Committee. *3 Negatives - 2 resolved -*
8. There being no additional business, the Subcommittee adjourned.
9. The next meeting will be May 10 to 13 in Ft. Lauderdale, Florida.

H.A. Pearce, Chairman
Insulating Fluid Subcommittee

APPENDIX "I"

PERFORMANCE CHARACTERISTICS SUBCOMMITTEE

Pittsburgh, Pennsylvania - October 14, 1986

MEETING MINUTES

I. INTRODUCTION/ATTENDANCE

The Performance Characteristics Subcommittee (PCS) met at 11:15 AM on Tuesday, October 14 with 35 members and 42 guests registering their attendance.

II. APPROVAL OF MINUTES

The minutes of the April 8, 1986 PCS Meeting were approved as submitted.

III. CHAIRMAN'S REMARKS

Open Project Authorization Requests (PAR) include:

1. Failure Analysis Guide - D.J. Cash
2. LTC Position Indication - C.G. Evans
3. Nameplate Information Change - J.W. Matthews
4. Routine Resistance Test - C.J. McMillen
5. Routine Impulse Test - W.R. Henning

There was no liaison report from Dave Smith concerning the Guide for Protection of Network Transformers.

Chuck McMillen presented a liaison report concerning Oil-Immersed Surge Arresters (Attachment A). SPD requested input on two issues: compatibility/loadability and fault current capability. At the direction of the Administrative Subcommittee, Chuck will indicate to SPD that compatibility should be left to the manufacturer and that fault current capability should be referred to NEMA/ANSI.

Reaffirmation of C57.105, The Guide for Application of Transformer Connections in Three-Phase Distribution Systems, has been submitted to the Standards Subcommittee (Attachment B).

Working Group D-6 of the Substations Committee offered an opportunity for liaison on their project P1109, "Design Guide for User-Owned Substations". A limited survey of PCS members indicated minimal interest; this was conveyed to WG D-6 (Attachment C). Subsequently, John Bergeron expressed an interest in providing a liaison role; this will be conveyed to WG D-6.

Previously approved changes regarding ratio tolerance and Telephone Influence Factor (TIF) test were included in the recently submitted revisions to C57.12.00 and C57.12.90.

All W.G. Chairmen should submit updated rosters directly to Bob Vietch ASAP for inclusion in the PES Organization Manual.

PCS membership changes include:

1. Addition of R.F. Dudley - Trench Electric
2. Addition of J. Fleeman - American Electric Power
3. Addition of D.S. Takach - Union Electric

PCS membership now stands at 55.

IV. AGENDA CHANGES

No agenda changes were identified.

V. WORKING GROUP (WG) REPORTS

The WG reported as follows:

1. Loss Tolerance and Measurement - W.R. Henning, Chairman

The Working Group on Loss Tolerance and Measurement met on Monday, October 13, 1986 at 10:05 AM with 15 members and 26 guests present. After approval of the minutes, the first item for discussion was the rewrite of Section 8 of C57.12.90. Section 8 is the section on "no-load losses and excitation current". A task force met Sunday afternoon to review a draft of a new Section 8. At its previous meeting, the task force had decided to hold an interim meeting to write the entire section at one time. When this meeting did not take place, Sam Mehta, chairman of the task force, put together the various proposals that had been made and wrote a new section. The task force reviewed this draft at its Sunday meeting.

Review of the draft continued at the Working Group meeting on Monday. The key issues are:

1. For three phase transformers, the three wattmeter method is specified. The guide will explain why the two wattmeter method and bridge method are not satisfactory for no load loss measurements on three phase transformers.

to be revised and reballotted.

Page 3
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Subcommittee Minutes

2. The effect of voltage imbalance during the three phase no load test was discussed at the Working Group meeting. This material will be covered in the guide.
3. The section on voltmeter connections, previously approved by the Transformers Committee, will be included in this draft as a paragraph in Section 8.2.
4. The present standard does not place a tolerance on the frequency of the test source. The new proposal places a limit on frequency of $\pm 0.5\%$ of the nominal value.
5. A limit will be placed on the maximum allowable waveform distortion by stating that the maximum allowable correction is 5%. If the correction exceeds 5%, then the waveform is not acceptable.
6. The question of how to assure that multiple zero crossings are not in the applied voltage waveform will be addressed before the next draft is circulated.
7. A proposal for temperature correction of no load losses will be included as Section 8.3.2. No changes were made in this proposal. The essential points remain as follows:
 - (a) 20°C reference temperature
 - (b) Empirical correction formula
 - (c) Top oil temperature to be measured
8. For the measurement of excitation current, the average voltage voltmeter, rms ammeter method will be specified.

It was left that the draft has received sufficient review that it could be circulated and a ballot conducted of the Working Group and the PCS simultaneously. Before its next meeting, the task force members will review Section 9 in preparation for a rewrite of the section on load loss measurements.

Having completed its review of Section 8, the Working Group then discussed a proposal to place a tolerance on the accuracy of the system used to measure transformer losses. The Working Group first addressed the question: Should the test system accuracy be specified in the standards? The answer, according to a show of hands, was "yes". But there were several concerns.

One concern was the method by which the accuracy is determined. Does the method need to be specified? Sam Mehta suggested that any method which is scientifically sound could be used, but that any method should consist of the following essential steps:

1. The transformer loss measurement facility develops its own standard for a voltage channel, a current channel, and a power channel.
2. The standards are calibrated at NBS or other standards lab over the entire measurement range.
3. The standards are used to calibrate each test system.
4. The error data is combined to determine the total system magnitude and phase angle errors, RSS and maximum.
5. The error is stated as a curve of relative error versus power factor.
6. A measurement assurance program is developed to maintain traceability to higher echelon standards.

These six steps should be required. Various methods could be used to determine accuracy. The guide would present material on how to accomplish the six steps. The NBS technical note would be referenced as an example of how to determine measurement accuracy.

A second concern was over how the information would be used. For example, if we set the overall accuracy requirement at 3%, and one test facility reports a 1.5% measurement accuracy, and a second test facility reports a 2.0% accuracy, then both measurements are valid and acceptable because they are within the required tolerance. However, the second test facility, with a higher stated error, may have been more conservative in summing the errors. The second facility should not be penalized for being more conservative. Thus, the information should be used to provide evidence that the measurement system accuracy is within the required tolerance. The stated measurement errors should not be added to reported losses.

A third concern was the liability of this group if someone should claim that the loss tolerance was designed to put someone out of business. It was suggested that we document the reasoning behind the specific values selected for tolerances. A proposal on loss tolerances will be circulated to working group members.

2. Harmonic Load Current Heating of Semi-Conductor Rectifier Transformers - G.C. Bryant, Chairman.

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The Working Group met in Pittsburgh on October 13, 1986 at 8:00 AM with 6 members and 6 guests present. The minutes of the Little Rock meeting were approved as read.

Attention was directed to Table 10 of Draft 4: "Limits of Transformer Winding Temperature for Defined Load Cycles", the discussion was as follows:

1. Table 10 is not referred to in the text and it should be. This will be added to Draft 5.
2. "Test Current" to be used for load loss tests and heat run tests is not clearly defined for a transformer without the rectifier connected. An attempt will be made to correct this in Draft 5.
3. It was agreed that the K factor (ratio of the common impedance to total impedance) should be given for each rectifier transformer, and that this test should be required by the standard.
4. It was agreed that E_r in Section 4 should not include the voltage drop of interconnections.
5. There were also some typo corrections.

To date, four of the seventeen ballots have been received on draft 4. It is planned to try for 100% of the ballots on draft 4, correct draft 4 as indicated, and reballot draft 5 before the next meeting.

3. Transformer Reliability - H.F. Light, Chairman

The WG met on Monday, October 13, 1986, with five members and fifteen guests. The chairman read three pieces of correspondence (Attachments D, E and F) dated March 25, April 16 and June 26, 1986 regarding approval of the Reliability Guide by the Standards Review Committee. The bottom line is that at the IEEE Standards Board meeting on June 19, 1986 the Reliability Guide (Project #C57.117 (786)) was approved as submitted. It now goes to the ANSI Accredited Standards Committee C57. Upon approval the guide will proceed to the Manager of Standard Publications.

The WG will continue to exist with the WG Chairman following the progress of the guide and reporting back to the WG at short

future meetings. Unfortunately, this may be the WG chairman's last meeting for the foreseeable future due to an austerity program at Niagara Mohawk Power Corporation.

4. Qualification of Transformers for Class IE Application in Nuclear Power Stations - L.B. Stensland, Chairman.

The Working Group met on Monday, October 13, 1986, with four members and one guest present. The minutes of the April 7, 1986 meeting were approved as written.

Since our previous meeting Preliminary Draft 15 of P638, dated May 27, 1986, was issued to the Working Group members. This draft reflected the resolution, by the Working Group, of the seventeen conditional affirmative and negative ballots submitted by the members of the NPEC/SC-2 committee on Draft 14 or P638.

After including some last minute comments, Preliminary Draft 15.1 of P638, dated October 9, 1986, was issued to each member of the NPEC/SC-2 Committee who had submitted a conditional affirmative or negative ballot. A copy of their own summary of comments, complete with the proposed resolution by the Working Group, was also sent.

Mr. W. H. Mutschler will attend the SC-2 committee meeting in Washington, D.C. on October 27, 1986, to hopefully resolve any outstanding comments.

Transformer Directly Connected to Generators - B.K. Patel, Chairman.

Chairman Patel called the meeting to order, call for introductions and approval of the minutes from the meeting at Little Rock, Arkansas. In attendance were: eight members and four guests. Mr. Patel reported on the Draft 8 ballots received to date: fourteen members, fourteen received (100%), ten approved, four approved with comments, five guests, three approved, two comments.

Comments received were editorial, not controversial. Received numerous comments, all comments were resolved. As a result of the discussions, the following will be added to the guide:

- a. A paragraph in the introduction, that will briefly describe other considerations to be evaluated, such as

Several comments - no negatives will be changed, reviewed by WG and if possible returned to the person Board

cooling requirements, single phase vs. three phase, losses, economics.

- b. A new section titled "Iso-phase bus coordination" will be added. This will briefly describe the problem overheating of bushing enclosure and transformer tank at the interface of Iso-phase bus and the step-up transformer.

6. Test Code for Shunt Reactors - J.W. McGill, Chairman.

This working group met at 3:05 PM on October 13, 1986. There were ten people present at this meeting; six members and four guests. The minutes of the last meeting in Little Rock, Arkansas were approved.

Draft #3 of the revision to the Test Code for Shunt Reactors was discussed in detail. This working group completed about half of this draft #3 during this meeting. The comments on the remaining portion of this draft will be forwarded to the Chairman within a few weeks.

The majority of the comments and/or corrections involved the incorporation of the dry-type shunt reactor statements into the appropriate paragraphs in the draft and the usual editorial and spelling corrections.

The Chairman requested any additional comments to be sent directly to him so a ballot of the working group members could be taken prior to the next meeting in Florida. If this is accomplished the ballot would involve the complete C57.21 revision with the exception of the Dielectric portion, which is being worked on in the task force, chaired by Bill Kennedy.

7. Failure Analysis - H.F. Light for D.J. Cash, Chairman.

The working group met on Monday, October 13, 1986 with eighteen members and twelve guests, with Hal Light sitting in for working group chairman Don Cash.

On August 13 and 14 a task force meeting was held in Detroit. At that time comments from draft #2 were incorporated into the Failure Analysis document. Draft #3 was produced and balloted in the work group. Ballots were due back September 30, 1986. Results of the ballot: 37 ballots sent to work group members, 25 ballots returned as follows: 15 approved, 8 approved with

Comments of dx

*18 Yes
2 No
1 Not voting*

- DS to be balloted by AG

comments, 1 negative and 1 not voting. The comments were extensive and will give the task force much information to produce Draft #4.

The negative ballot was addressed at the work group meeting and it was determined it can be resolved by classifying, by importance, how to handle a failed transformer failure analysis, especially - testing. There was also a very spirited discussion regarding the interrelationship of user, insurance company and manufacturer during an investigation of a transformer failure.

It is anticipated that a task force meeting will be held in Detroit to produce draft #4, to be balloted in the work group.

VI. PROJECT REPORTS

1. LTC Position Indication - C.G. Evans

No report.

2. Nameplate Information Change - J.W. Matthews

Draft 2 of the proposal to add a "directed flow" designation to the nameplate received 3 negative ballots (Attachment G). Additional input is required from the Loading Guides WG: this project will be placed on hold pending that input.

3. Routine Resistance Test - C.J. McMillen

The proposal to make resistance measurements a design test for three-phase distribution transformers rated 501 to 2500 KVA is presently being balloted in the PCS and Transformers Committee (Attachment H). Negative ballots received to date raise concerns about the impact on loss test accuracy; the proposal may need modification to clarify the impact on load loss tests.

VII. OLD BUSINESS

1. Interpretation of C57.12.90, Section 5.3.2.3 - R.H. Frazer

An interpretation regarding the location of voltmeter leads for the purpose of resistance measurement (described in Section 5.3.2.3) has been developed and will be submitted (Attachment I). In addition, a rewording of the Section to improve clarity has been proposed

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Subcommittee Minutes

(Attachment J) and will be considered by the Loss Tolerance and Measurement W.G.

VIII. NEW BUSINESS

1. L.S. McCormick reported possible confusion in the interpretation of the through-fault duration curve for Class IV transformers in C57.109, the Through-Fault Duration Guide. No action was initiated on this issue.

IX. NEXT MEETING

The next meeting will be held on Tuesday, May 12, in Ft. Lauderdale. The meeting was adjourned at 12:20 PM.

John D. Borst
Chairman

3907e

GENERAL  ELECTRIC

TRANSFORMER BUSINESS DEPARTMENT
GENERAL ELECTRIC COMPANY • P.O. BOX 2188 • HICKORY, NORTH CAROLINA 28603-2188 • (704) 462-3000

October 10, 1986

<p>Messrs: D. A. Yannucci Westinghouse Electric Corp. 651 Holiday Drive Pittsburgh, PA 15802</p>	<p>J. D. Borst Westinghouse Electric Corp. PO Box 883 Jefferson City, MO 65102</p>
--	--

Subject: Liaison Report to the Performance
Characteristics Subcommittee

Report: Liaison to IEEE Surge Protective Devices Committee's
Oil-Immersed Surge Arrester Task Group of Working
Group 3.3.10

This Oil-Immersed Surge Arrester Task Group met October 1, 1986 in Seattle. I attended as the Transformer Committee's liaison to this Task Group. The subject of the meeting was the development of proposed design tests for this new application of gapless zinc oxide distribution arresters. Most of the meeting was occupied with your liaison presenting his views on the concerns of transformer manufacturers and users on desirable design tests to address compatibility and safety concerns.

In reference to compatibility, the major concerns are assurance that the under-oil arrester will not limit the loadability of the transformer nor the transformer's insulation system and not limit the protective effectiveness of the arrester. One possibility is an adoption of functional life test C57.100 with the provision that the test be performed with the addition of the arrester mounted and connected during the test. The other possibility is that the transformer manufacturer perform his normal tests that assure compatibility of accessories in the oil-filled transformer environment.

In regard to safety, the primary concern is the consequences of failure of the arrester within the transformer. One possibility is a test added to the recently adopted C57.20 Appendix "Design Tests for Fault Current Capability of Overhead Distribution Transformer Enclosures". The new test would presumably be similar to the present 1" arc tests or the tests with internal fusible elements, except that an under-oil arrester would be failed by deliberate low frequency overvoltage, or preliminary damage of the arrester by overvoltage with a few amperes of available current, then application of maximum continuous overvoltage with full available fault current.

mc/1010-1

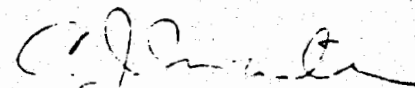
DA Yannucci/JD Borst
October 10, 1986
Page 2

The purpose will be to demonstrate the probable maximum symmetric available current at which cover retention can be assured. Another question is whether the arrester should be in an open-circuit or short-circuited mode after failure.

Since most of the members of the task group are not familiar with transformers, the group requested that the Transformer Committee take the lead in developing design tests addressing these two concerns. I agreed to transmit their request to the Transformer Committee and notify the Task Group of our decision.

There may be a question of scope between the Transformer Committee and the NEMA C57.12.20 Technical Committee in regard to the proposed addition to the fault current capability test, since the latter committee developed that test. In regard to compatibility tests for accessories within the oil-filled transformer environment, I am not aware of any existing ANSI or IEEE standards tests directly addressing that subject. I believe that it has been left to the transformer manufacturer to develop his own policy and tests. I request that the Transformer Committee make a decision on its response to the SPD Committee before its next meeting.

The next meeting of the SPD Task Group is scheduled for April 1987 in New Orleans.



C. J. McMillen
Liaison to SPD Committee's
Task Group on Under-Oil Arresters

mc/1010-2



ATTACHMENT B

Westinghouse
Electric Corporation

Transformer Divisions

Distribution Transformer
Division
Jefferson City Plant

Box 883
500 Westinghouse Drive
Jefferson City Missouri 65102
314.634.2111

April 15, 1986

Mr. L. R. Smith
Tennessee Valley Authority
1101 Market St. LP1S45H
Chattanooga, Tennessee 37402-2801

Dear Mr. Smith:

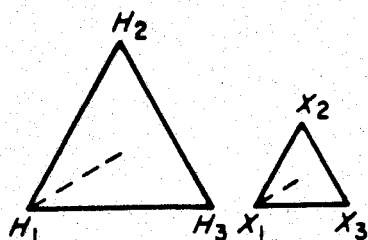
With regard to C57.105-1978 (Guide for Application of Transformer Connections in Three-Phase Distribution Systems), the following actions have been taken:

- 1) At their regularly scheduled meeting on April 8, 1986, the Performance Characteristics Subcommittee of the IEEE Transformers Committee voted unanimously to re-affirm C57.105.
- 2) At their regularly scheduled meeting on April 9, 1986, the IEEE Transformers Committee also voted unanimously to re-affirm.

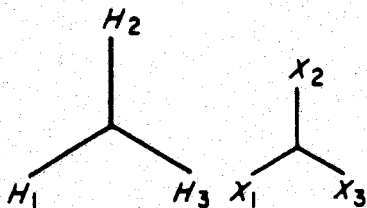
With the exception of an editorial correction (attached), C57.105 should be re-issued without change.

John Borst, Chairman
Performance Characteristics Subcommittee

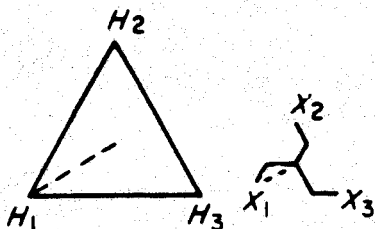
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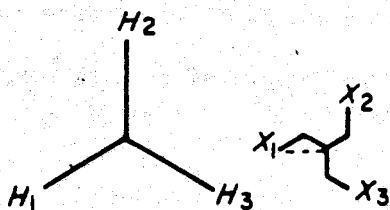
Δ-Δ CONNECTION



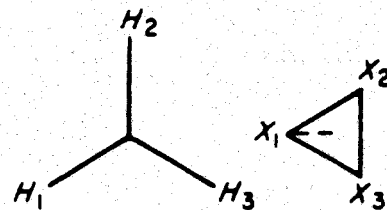
Y-Y CONNECTION



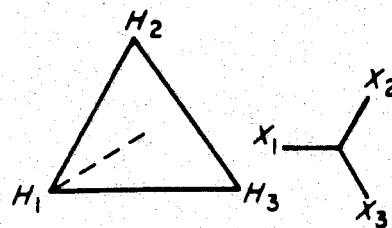
Δ-ZZ CONNECTION



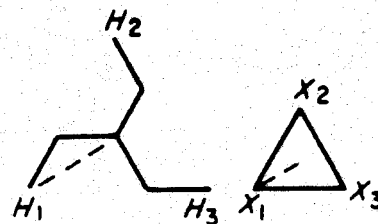
Y-ZZ CONNECTION



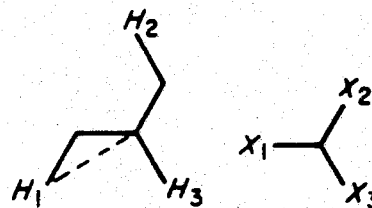
Y-Δ CONNECTION



Δ-Y CONNECTION



ZZ-Δ CONNECTION



ZZ-Y CONNECTION

Fig 4
Phase Relation of Terminal Designations for
3-Phase Transformers

First, the impedance values are put on a common base. The base selected is 500 kVA, 13 200 V so that Transformer A values need not be shifted:

$$\frac{500}{300} \times \left(\frac{12\,470}{13\,200} \right)^2 \times 4.5 = 6.7\% \text{ impedance for Transformer B}$$

Second, the unbalanced open-circuit secondary voltage in percent is determined:

$$\left[\left(\frac{13\,200}{12\,470} \times \frac{460}{480} \right) - 1 \right] \times 100 = 1.44\% \text{ higher secondary voltage for Transformer B}$$



ATTACHMENT C

Westinghouse
Electric Corporation

Transformer Divisions

Underground Distribution
Transformer Division

Box 883
600 Westinghouse Drive
Jefferson City, Missouri 65102
314 634 2111

July 29, 1986

Mr. T. J. Kolenda
Chairman Working Group D-6
Bechtel Power Corporation
15740 Shady Grove Road
Gaithersburg, Maryland 20877-1454

SUBJECT: P1109, "Design Guide for User-Owned Substations"

Dear Mr. Kolenda,

Based on review of Draft 1 by several committee members, it appears that the subject document will have little, if any, impact on IEEE Transformers Committee issues. Accordingly, no future liaison/coordination will be required.

Several members did, however, comment on Draft 1. Their input is attached for your consideration.

John D. Borst
Chairman, Performance
Characteristics Subcommittee

cc: J. J. Bergeron
W. B. Binder
C. G. Evans
D. J. Cash
H. J. Light
J. W. Matthews
W. J. McNutt
L. S. McCormick
B. K. Patel

March 25, 1986

Mr. Harold F. Light
Niagara Mohawk Power Corporation
300 Erie Blvd. West (D:G)
Syracuse, N.Y. 13203

Re: P786 - Reporting Failure Data for Power Transformers and
Shunt Protectors on Electric Utility Power Systems, Guide
for

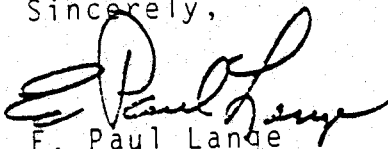
Dear Mr. Light:

The P786/D8 dated June 1, 1985, was considered by the IEEE Standards Board Review Committee. Following considerable discussion, they recommended this project be returned to the Sponsoring Subcommittee for action as noted below. The Standards Board approved this recommendation on March 13, 1986.

- A) To verify by copy of letter that coordination has been completed with all specified organizations (with particular emphasis on a reply from Edison Electric Institute).
- B) The Review Committee considers it essential that coordination also be established with the National Regulatory Commission. (This Commission represents all State Regulatory bodies which could be affected by the recommendations of this proposed Guide).
- C) To indicate that all balloting members had been advised of the legal questions raised by a manufacturer, and that this advice did not create further negative ballots.

We will hold all present documentation on P786 in our files, pending clarification of the above questions.

Sincerely,



E. Paul Lange
Secretary
Standards Review Committee

cc: L.R. Smith
O.R. Compton
Judith Gorman



Standards Project Authorization

1. <u>February 6, 1979</u> Date of Request	Project No <u>786</u> Approved: <u> </u> Date: <u>March 98</u> For Standards Committee Use Only
2. <input type="checkbox"/> New Guide <input type="checkbox"/> Revision of _____ Standard No	Reaffirmation of _____ Withdrawal of _____ Standard No
3. Project Title: <u>Transformer Failure Reporting and Reliability Analysis</u>	
4. Scope and Purpose of Proposed Standard: <u>Preparation of a Guide for Transformer Failure Reporting and Reliability Analysis.</u> <u>The intent is to develop a standardized method for accumulating statistical data on transformer reliability which can gain wide industry acceptance.</u>	
5. Sponsor: <u>Transformers Committee</u> Technical Committee	<u>Power Engineering Society</u> Society
5a. Proposed ANSI Committee: <u>C57</u>	ANSI Project #: _____ Date Approved: _____
6. Proposed Coordination: <u>EEI</u> <u>IAS</u> <u>T&D, NPEC, PCC/PES, ETTC, IEC TC-56, NERC</u>	Method of Coordination: <u>Liaison Representative</u> <u>Liaison Representative and circulation drafts.</u> <u>Circulation of drafts.</u>
7. Name of Group that will Write the Standard: <u>Performance Characteristics</u> Subcommittee	<u>WG on Transformer Reliability</u> Working Group
8. Estimated Final Ballot Date: <u>March 1982</u> To Technical Committee	<u>October 1982</u> To Standards Board
9. Person Delegates to Receive Communications and Conduct Liaison with Interested Bodies: <u>Harold F. Light</u> Name <u>Niagara Mohawk Power Corporation</u> Company <u>300 Erie Boulevard West</u> Street address <u>Syracuse, NY 13202</u> City State Zip Code Telephone: <u>315-474-1511</u>	
10. Submitted by: <u>Leonard W. Long</u> Name <u>Duke Power Company</u> Company <u>P.O. Box 51189</u> Street address Street address City State Zip Code Telephone: <u>704-373-4291</u>	

April 16, 1986

Mr. E. Paul Lange
Secretary, Standards Review Committee
IEEE Standards Office
345 East 47th Street
New York, NY 10017

Ref: P786 Guide for Reporting Failure Data
for Power Transformers and Shunt Reactors
on Electric Utility Power Systems

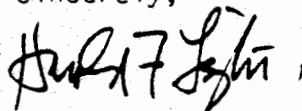
Dear Paul:

In response to your letter of March 25, 1986, please consider the following in the same order as your letter:

- A. Attached is correspondence from me as Chairman of the Working Group to various liaison organizations. Before we balloted the Main Transformers Committee I included organizations concerned with Transformer Reliability that our Working Group knew of, but these organizations were not listed on the PAR. Such groups as: DOE, EPRI, CIGRE WG 12.05, CEA, IEEE Substations, ASOC and NEMA. As you can see, these were not part of the original PAR. CIGRE WG 12.05 was very impressed with our work since they had just completed an international survey. Then when we got to balloting the Main Transformers Committee, I discussed the procedure with our Working Group members and the consensus was to allow only those organizations listed on the PAR the voting right when the Main Committee was balloted. You can follow this with correspondence attached from 1982, 1983 and 1985. EEI approved the document and they have been getting and reviewing it from the start.
- B. I have taken this to the IEEE Transformers Committee and have been informed that Mr. Fred Huber of IEEE will be in touch with you. My personal feeling is that this should have been on the original PAR to be valid.
- C. This document passed through and was balloted by all members of the IEEE Transformers Committee four times. There was numerous discussions regarding the Westinghouse negative ballot. As a result, no other member of the committee even considered changing their ballot to negative.

Please advise of further action to be taken.

Sincerely,



Harold F. Light
Chairman, Working Group on
Transformer Reliability
IEEE Transformers Committee

HFL/jdc

cc: L. R. Smith
O. R. Compton



IEEE

STANDARDS OFFICE

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
345 EAST 47TH STREET, NEW YORK, N.Y. 10017-2394, U.S.A. TELEX 236411

DIRECT NUMBER
(212) 705-7960

June 26, 1986

Mr. Harold F. Light
Niagara Mohawk Power Corporation
300 Erie Blvd. West (D:G)
Syracuse, NY 13202

Subject: Project No. C57.117 (786) - Reporting Failure Data for Power Trans-
formers and Shunt Protectors on Electrical Utility Power Systems,
Guide for

Dear Mr. Light:

The subject document was considered for approval at the IEEE Standards Board meeting on 19 June 1986.

We are pleased to inform you that this New Standard was approved as submitted.

This Standard will now be submitted to the ANSI Accredited Standards Committee C57. Upon approval, the document will be turned over to the Manager of Standards Publications, Judith Gorman, who will be in touch with you.

Sincerely,

E. Paul Lange
Secretary
Standards Review Committee

cc: L.R. Smith
Fred Huber
Judith Gorman

*XC: To all Working Group Members:
Your work has paid off, the document will
go to press from the look of things -
Regards
WG chair man
Hal Zita*



ATTACHMENT G

CHARLES CENTER • P.O. BOX 1475 • BALTIMORE, MARYLAND 21203

ELECTRIC TEST DEPARTMENT

October 10, 1986

Mr. W. E. Wrenn
Nebraska Public Power District
P. O. Box 499
Columbus, Nebraska 68601

Dear Bill:

Subject: Working Group - Guides for Loading
Request for Revision of Nameplate Information

The Performance Characteristics Subcommittee is presently working on resolution of three negative ballots received on Draft 2 of this project.

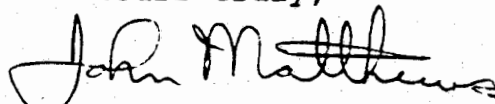
I thought it would be appropriate to bring several items to your attention which have caused difficulties in agreement on this revision.

These items are:

1. The term "Directed Flow" is undefined.
2. "Directed Flow" applies to design of windings, not transformers. A transformer may have one or more windings with directed flow.
3. "Directed Flow" may apply to windings which are cooled by natural convection (OA) in addition to those which are cooled by forced convection (FOA).

These items should be considered in revisions of the transformer loading guides.

Yours truly,


John W. Matthews

JWM/mdh

cc: Mr. J. D. Borst



CHARLES CENTER • P.O. BOX 1475 • BALTIMORE, MARYLAND 21203

August 4, 1986

ELECTRIC TEST DEPARTMENT

TO: Members of Performance Characteristics Subcommittee
FROM: John W. Matthews
SUBJECT: Ballot on Draft 2 - Proposed Revision to ANSI/IEEE
C57.12.00, Table 7 - Nameplate Information, Note (2)

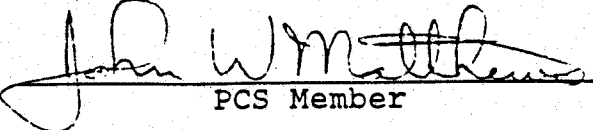
A request was made by the Guides for Loading Working Group of the Insulation Life Subcommittee to revise the nameplate information on forced-oil cooled transformers to indicate whether the oil flow is "directed" or "nondirected".

The purpose of this revision is to supply additional information required to use the transient heating equations in the Transformer Loading Guides.

Draft 1 of a proposed revision was balloted in the Subcommittee earlier this year. Two negative and three affirmative ballots were returned with comments.

Draft 2 of a proposed revision has been developed to resolve the negative ballots and comments received on Draft 1.

Please review the attached proposal and return your ballot by September 30, 1986.


PCS Member

Draft 2 - Proposed Revision to ANSI/IEEE C57.12.00,
Table 7 - Nameplate Information, Note (2)

Present Wording:

(2) Where the class of transformer involves more than one kVA (or MVA) rating, all ratings shall be shown.

Any winding, such as tertiary, which has a different rating shall have its kVA (or MVA) suitably described.

Where the transformer has more than one temperature rating, the additional rating shall be shown on the nameplate.

Provision for future forced-cooling equipment shall be indicated.

Proposed Addition:

The words "Directed Flow" shall be included on the nameplate of transformers with one or more windings cooled by channeling the insulating liquid through the coils.

8/4/86 - JWM

PERFORMANCE CHARACTERISTICS SUBCOMMITTEE
SUMMARY OF BALLOTS

Document: Draft 2 - Proposed Revision to ANSI/IEEE C57.12.00,
Table 7 - Nameplate Information, Note(2)

I. Tally

Date of Ballot 8/4/86
Closing Date 9/30/86
Number Mailed 51

Affirmative Ballots		36
Without Comments	33	-
With Comments	3	- (see Part III)
Negative Ballots		4 (see Part II)
Not Voting Ballots		3
Ballots Not Returned		8

Tally 51 Ballots

% of Ballots Returned 84 % Returned

II. Negative Ballots

A. Alternative Proposal: J. A. Ebert

Add words " forced oil cooled ", between words of, and,
transformer.

Resolution: By phone 10/7/86

I explained that the words " forced-oil cooled " were
included in Draft 1. These words were dropped in the
resolution of a negative ballot due to the fact that
convection cooled transformers also can have directed
flow.

This explanation was accepted, noting that the majority
of directed flow applications involve forced-oil cooling.

The ballot was changed from negative to affirmative.

Performance Specification or Certified Test Report. This suggestion would, of course, involve additional revision of either ANSI C57.12.00 or NEMA TR1.

D. Alternative Proposal: J. W. Grimes

Recommend: The words " Directed Flow " shall be included on the nameplate of transformers with fluid flow restricted on one or more windings resulting in forced fluid flow thru the windings.

Reason:

" Channeling the insulating liquid through the coils " does not constitute " Directed Flow ". If this were so, essentially all transformers would have directed flow. Also, cooling must be forced to constitute directed flow.

Resolution:

Discussed by phone 10/8/86. Not resolved - Refer to Subcommittee.

" Directed flow " cooling is not defined in ANSI Standards. Should we include the definition in this Nameplate Information ?

III. Comments With Affirmative Ballots

A. Comment: V. Thenappan

Revise to read "...nameplate of forced oil cooled
transformers with...".

Resolution: By phone 10/7/86

Same as Item II.A.

B. Comment: R. H. Frazer

Question: To be used as a determination of overload capability, should it not specify exactly which windings are directed flow instead of " one or more " ?

GENERAL  ELECTRIC

TRANSFORMER BUSINESS DEPARTMENT
GENERAL ELECTRIC COMPANY • P.O. BOX 2188 • HICKORY, NORTH CAROLINA 28603-2188 • (704) 462-3000

September 10, 1986

Subject: Revision of ANSI C57.12.00-1980, Table 14
To Make Resistance Measurements a Design Test
for Three-Phase Distribution Transformers
Rated 501 to 2500 kVA

To: Transformers Committee and Performance
Characteristics Subcommittee Members

A proposal to change routine test requirements for three-phase distribution transformers rated 501 to 2500 kVA was approved by the Transformer Committee and the IEEE Standards Board in 1978. The change was to make resistance measurements a design test rather than a routine test requirement. Unfortunately, the change was not incorporated with the revision of C57.12.00-1980. To remedy this situation, the Administrative Subcommittee has requested that the proposal be resubmitted for ballot by members of the Transformers Committee and Performance Characteristics Subcommittee. A Standards Project Authorization (PAR) request has been submitted for consideration by the New Standards Review Committee (NESCOM) but a number has not as yet been received. However, to expedite the proposal we are going ahead with balloting.

The reason for this proposal is that the manufacturing volume of distribution transformers rated 501 through 2500 kVA is substantial, with electrical design duplicates a common occurrence. Routine resistance measurements provides little or no benefit when measurements on duplicate transformers are available and impedance voltage and load loss measurements are retained as a routine requirement for these ratings. During balloting preceding approval of this change in 1978, it was also considered that impedance and load loss tests be made a design test requirement as they are for ratings 500 kVA and below.

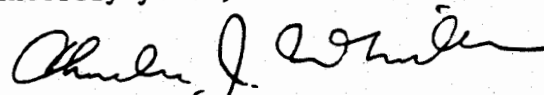
However, that part of the proposal was not approved since ratings above 500 kVA have an impedance voltage guarantee in their product standards (5.75%), while transformers 500 kVA and below have no impedance voltage guarantee. Also, retention of load loss measurement as a routine requirement provides a check on load losses for comparison with the resistance and load loss measurements made on the initial design test transformer.

Transformer Committee and Performance
Characteristics Subcommittee Members
September 10, 1986
Page 2

The distribution transformers that will be affected by this proposal are three-phase, padmounted, compartmental type and underground transformers covered by product standards C57.12.22, C57.12.26 and C57.12.24.

Please consider this proposal and submit your ballot promptly.

Sincerely yours,



Charles J. McMillen

mcm/0828
attachment

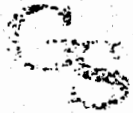
Draft 1 - Proposed Revision of ANSI/IEEE C57.12.00--1980, Table 14,
Resistance Measurements, Note 1.

Present Wording:

Notes: (1) Resistance, impedance and load-loss tests are design tests for distribution transformers 500 kVA and smaller and shall be omitted when a record of such tests made on a duplicate or essentially duplicate unit in accordance with this standard are available.

Proposed Wording:

Notes: (1) Resistance is a design test for distribution transformers 2500 kVA and smaller. Impedance and load loss tests are design tests for distribution transformers 500 kVA and smaller. These tests shall be omitted when a record of such tests made on a duplicate or essentially duplicate unit in accordance with this standard are available.



HEVI-DUTY ELECTRIC

PO BOX 268 • GOLDSBORO, NORTH CAROLINA 27530 • PHONE 919-734-8900

October 21, 1986

Mr. R. M. Blythe
Quality Assurance Manager
Balteau Standard Inc.
8001 Table Rock Road
Medford, Oregon 97503-1089

Dear Mr. Blythe:

An interpretation ballot was sent to members of the Performance Characteristics Subcommittee of the IEEE Transformers Committee concerning your question on ANSI/IEEE C57.12.90 Section 5.3.2.3 - resistance measurement lead location. The resulting interpretation in the form of items to be considered for resistance measurements is attached. The interpretation contains comments from members of the Subcommittee along with the following summarization paragraph:

"With specific regard to resistance measurement for calculation of winding temperatures, the preferred location would be at the external terminals for liquid-filled apparatus. However, direct placement on the winding leads is acceptable provided that the above-listed considerations are met."

If you have any questions concerning the interpretation, please contact John Borst, Chairman of the Subcommittee, or myself.

Sincerely,

Robert H. Frazer, Member
Performance Characteristics Subcommittee

cc: John D. Borst, Chairman
Performance Characteristics Subcommittee
Westinghouse Electric Corp.
PO BOX 883
Jefferson City, MO 65102

DRAFT 2 - INTERPRETATION OF SECTION 5.3.2.3
OF ANSI/IEEE C57.12.90 - 1980 WITH REGARD
TO LOCATION OF VOLTMETER LEADS.

With regard to the location of voltmeter leads for the purpose of resistance measurement, Section 5.3.2.3 states:

"5.3.2.3 The voltmeter leads shall be independent of the current leads and shall be connected as closely as possible to the terminals of the winding to be measured. This is to avoid including in the reading the resistances of current-carrying leads and their contacts and of extra lengths of leads."

When applying this directive, the following should be considered:

- 1) The location should be appropriate to the purpose of the measurement. For example, the I²R losses should include the bushing and internal lead losses; therefore, the measurement should be taken at the external terminals.
- 2) The location should be consistent from test to test and unit to unit when comparison of test values is required.
- 3) The location should be safely accessible in a practical manner.
- 4) The location should not prevent timely measurement when timeliness is of importance such as during measurement of winding temperature.
- 5) The location should not prevent measurements for the detection of hot connections between winding leads and external terminals during a thermal test. Such measurements should be taken at the external terminals.
- 6) The location should not prevent sealing of the tank during thermal testing when dissolved gas-in-oil, bubble evolution, or maximum gas pressure data is to be obtained.
- 7) Certain design configurations with buried windings such as tertiaries or LTC windings could require resistance measurements at some point other than the external terminals for both thermal and I²R tests. In such cases, those measurements should be made at the appropriate point inside the tank.

With specific regard to resistance measurement for calculation of winding temperatures, the preferred location would be at the external terminals for liquid-filled apparatus. However, direct placement on the winding leads is acceptable provided that the above-listed considerations are met.

DRAFT 1 - REVISION OF SECTION 5.3.2.3
PARAGRAPH 1 OF ANSI/IEEE C57.12.90 - 198X

A proposed rewording of C57.12.90 Section 5.3.2.3, paragraph 1 would be as follows:

"5.3.2.3 The voltmeter test leads shall be independent of the current test leads and shall be connected to the terminals of the transformer to be measured. This is to avoid including in the reading the resistances of current-carrying test leads and their contacts."

Appendix J

IEEE WEST COAST TRANSFORMER SUBCOMMITTEE Seattle, Washington

MEETING MINUTES
FEBRUARY 19, 1987

Opening

The meeting was called to order by Herb Johnson, Seattle City Light, at 1:30 PM. Herb welcomed 9 members and 11 guests.

The minutes from the September 17, 1986, meeting held in Anaheim, California were read and approved, with the correction that the attendance should reflect the fact that Mr. Ray Allustiarti of Pacific Gas & Electric was represented at the meeting by Mr. Peter Lai of Pacific Gas & Electric.

The election of new officers was postponed until later in the meeting.

Membership

Mr. Lou Tauber has replaced Karl Bryan as the representative from the Corps of Engineers on the Subcommittee.

Gary McCulla of Salt River Project is representing Dennis Gerlach of Salt River Project at this meeting.

A letter from Steve Benko of Southern California Edison was read by Herb Johnson. We learned that Mr. Benko will soon be retiring from Southern California and therefore will also be retiring from the West Coast Transformer Subcommittee.

Administrative Business

Herb Johnson read a letter from the IEEE instructing all working group members to sign a form which will then be sent to IEEE Standards office in New York. This form is for the purpose of indemnification of members working on Standards or Guides. The form essentially puts all Working Group members under the IEEE legal "umbrella". Herb will give a copy of the letter and forms to all Working Group chairmen, and contact the Standards Committee for further clarification. Prior to the next meeting the Secretary will mail a letter from Herb Johnson to each member inquiring as to which working groups each member is on.

Working Group Reports

- * Roger Jacobsen reported on the Transformer Loss Evaluation Guide. Roger reported that a draft of the Guide was discussed at the full Transformer Committee meeting in Pittsburg, and noted that all comments have now been incorporated. The latest draft was passed out for further comments. Mr. Jacobsen will now send the draft to the main Committee for ballot prior to our next meeting in San Francisco in July.

- * Del Johnson reported on the consolidation of the Transformer Installation Guide. Del reported that John Galbraith and Leonard Zachrison can not participate in working group meetings in the near future. Del commented that attendance at the working group meetings was becoming a problem and therefore most of the work was, by necessity, being handled by correspondence. Herb Johnson commented that it was imperative that at least some working group members attend the group's meetings. A sheet was circulated for committee members to volunteer to work on any of the four working groups. Del Johnson had draft copies of three documents of the working group's work to date available, and encouraged members to send their comments to him prior to the July meeting in San Francisco.
- * Herb Johnson reported on the Transformer Fire Protection Guide. The discussion centered on the suggestion that this Guide be incorporated in Substation Fire Protection Guide. The consensus of the membership appeared to be that the Transformer Fire Protection Guide should not be combined with the Substation Fire Protection Guide.
- * Sam Oklu reported on the Transformer Seismic Guide. Sam reported that the changes recently received are mainly format changes. The work at this morning's working group meeting together with any changes received prior to April 15, will be incorporated into draft number 16. This draft with changes noted will then be mailed to working group members. Discussion of this draft is planned for the the July meeting in San Francisco. The comment was made that this Guide should be coordinated with the Substation Seismic Guide Working Group. Sam responded that he will contact the Substation Committee as well as the Standards Committee. In summary, Mr. Oklu estimated this Guide should be completed in approximately a year.

Election of New Officers

The new officers elected were:

Chairman:	Dennis Gerlach, Salt River Project
Vice Chairman	Samual Oklu, Los Angles Department of Water and Power
Secretary:	Lou Tauber, U. S. Army Corps of Engineers

Topics of Discussion

Transformer replacement as determined by life cost analysis:

Gary McCulla reported his utility recently justified replacing a transformer based on the cost of losses. It was, however, pointed out this transformer (230/69 kV, 187 MVA) was twenty-three year old and had been gassing. The question was then asked: Does anyone have a policy of transformer replacement based on a life cost analysis alone?

One comment was that this type of analysis would be very sensitive to the cost of money.

One member reported his utility is just beginning to looking at the cost of owning some of their older transformers, but does not anticipate replacing any transformers prior to their failure.

Sam Oklu of Los Angeles Department of Water and Power, reported they are currently purchasing two 160 MVA mobile transformers. These mobile transformers have a dual voltage primary, 230 and 138 kV with a 34.5 kv secondary. Sam stated his utility's policy is to not replace a transformer until it failed.

Bushing connection methods:

Herb Johnson, Seattle City Light, reported his utility in the past specified a draw lead type bushing on their transformers for interchangeability with other existing bushings on their system. They received the proper bushing, however the draw lead (the lead from the transformer winding to the top of the bushing) was not always of sufficient ampacity to carry the transformers load. Herb then posed the question: Have others had this problem with draw lead bushings, or do they use bottom connected bushings?

One person present stated that there is Bushing Loading Guide in draft form that when published will help alleviate this type problem.

Other comments were that a purchaser should not only specify the continuous current rating of bushings but also check the bids and the transformer when received. Another comment was that the only advantage of the draw lead type bushing was the fact that the transformer oil would not have to be drained to change out for bushing replacement.

New Business

The next Subcommittee meeting will be held in San Francisco the week of July 14, 1987.

Attendance

Members

C. F. Todd
Tacoma City Light

D. C. Johnson
Self Employed

Roger Jacobsen
Retired

Ray Allustiarti
P. G. & E.

Lou Tauber
Corps of Engineers

Herb Johnson
Seattle City Light

Samual Oklu
L. A. Dept. of Water & Power

R. J. Norton
McGraw Edison

D. A. Gillies
Consultant

Guests

Gary McCulla
Salt River Project

D. R. Schafer
Puget Power

J. R. Bode
Puget Power

Bob Clark
Montana Power

Luther Kurtz
Engr & Design Assoc.

Mac McEvers
P. P. & L.

Dan Nix
San Diego Gas & Elect.

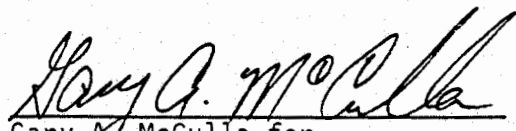
John Norberg
Seattle City Light

Denise Roth
Seattle City Light

Fred L. Rose
Tacoma City Light

R. M. Young
Seattle City Light

Respectfully submitted,



Gary A. McCulla for
Dennis W. Gerlach
Secretary
West Coast Transformer Subcommittee

Appendix "K"

ANSI C89 REPORT

10/15/86

1. No ANSI meeting has been held since the last report.

2. ANSI C89.2-----Dry Type Transformers for General Applications.

o The Codes and Standards Board has approved revisions to remove high voltage (>1.2kv) references, but retain sound level limits for above 1.2kv Class. The revised Standard is in process of being published.

3. ANSI C89.1-----Dry Type Machine Tool and Control Transformers.

o A ballot for re-affirmation was re-issued with a September 23 ballot date. Ballots are now in and being processed.

S. J. Antalis

Liaison Representative