

MINUTES OF THE IEEE/PES

TRANSFORMERS COMMITTEE

OCTOBER 30, 1985

TORONTO, ONTARIO, CANADA.

MEMBERS OR REPRESENTATIVES PRESENT (75)

D. J. Allan
B. F. Allen
R. J. Alton
E. H. Arjeski
J. C. Arnold
J. D. Borst
G. H. Bowers
D. J. Cash
 E. Chitwood
O. R. Compton
F. W. Cook
D. W. Crofts
D. H. Douglas
J. D. Douglass
J. C. Dutton
J. K. Easley
J. A. Ebert
E. C. Edwards
C. G. Evans
W. R. Farber
H. G. Fischer
S. L. Foster
 M. Frydman
D. A. Gillies
R. L. Grubb
 G. Gunnels
 G. Hall
J. W. Harlow
F. W. Heinrichs
 W. Henning
K. R. Highton
C. C. Honey
 F. Huber
 C. Hurty
R. G. Jacobsen
C. P. Kappeler
 O. Keller
J. J. Kelly
W. N. Kennedy
 E. Koenig

J. G. Lackey
H. F. Light
R. I. Lowe
M. L. Manning
S. P. Mehta
 C. Millian
R. E. Minkwitz
L. S. McCormick
J. W. McGill
C. J. McMillen
W. J. McNutt
E. T. Norton
B. K. Patel
H. A. Pearce
D. D. Perco
D. A. Roach
L. J. Savio
 V. Shenoy
W. W. Stein
L. R. Stensland
R. B. Stetson
E. G. Strangas
A. L. Tanton (Represented by
 R. Acton)
 V. Thenappan
F. W. Thomason
R. C. Thomas
D. E. Truax
R. E. Uptegraff
R. A. Veitch
L. B. Wagenaar
R. J. Whearty
W. E. Wrenn
A. C. Wurdack
D. A. Yannucci
E. J. Yasuda

MEMBERS ABSENT (35)

R. Allustiarti
S. J. Antalis
R. Bancroft
P. L. Bellaschi
J. J. Bergeron
J. V. Bonucchi
J. Corkran
M. G. Daniels
R. L. Ensign
P. P. Falkowski
H. E. Gabel
A. W. Goldman
T. K. Hawkins
P. J. Hoefler
G. W. Iliff
A. J. Jonnatti
A. D. Kline
W. Lampe

T. G. Lipscomb
R. Little
H. B. Margolis
J. W. Mathews
N. J. Melton
C. K. Miller
H. R. Moore
R. J. Musil
W. H. Mutschler
G. C. McCrae
C. A. Robbins
B. E. Smith
J. A. Thompson
T. P. Traub
J. W. Walton
A. Wilks

GUESTS (44)

J. M. Pollitt
C. V. Brown
G. C. Bryant
S. Tennert
W. E. Saxon
J. Nay
J. Rossetti
H. J. Windisch
D. J. Fallon
P. Iijima
J. N. Davis
F. J. Gryszkieuicz
D. Heath
V. Dahinden
H. P. Moser
C. Hoesel
R. L. Provost

S. K. Oklu
E. Howells
W. J. Carter
G. H. Vaillancourt
D. Payne
J. T. McAlpin
W. Boettger
P. Singh
J. L. Moon
L. A. Swenson
R. L. Lane
R. H. Frazer
D. A. Barnard
J. Antweiler
R. Grunert
C. S. Yung
L. M. Nicholas

M. I. Mitelman
T. Lazarz
S. Moore
G. A. Klein
E. R. Lane
S. D. Northrup
W. B. Bender
F. N. Young
D. A. Whiteley
L. D. Miller

1. Chairman's Remarks and Announcements

Chairman Dean Yannucci convened the meeting at 8:00 a.m. with 75 members and 44 guests present. Appreciation was expressed to the Toronto Host Committee for the work done in organizing the Toronto meeting. Total registration for the Toronto meeting was 181 members and guests. All attendees made self-introductions.

The Chairman noted that attendance at the Main Committee meeting generally suffered a noticeable decline after the coffee break. He requested that members schedule their departure no later than noon so that they will be present for the entire meeting.

Comments were also solicited on the revised meeting format, i.e. with working group sessions held during the first session on Tuesday. Please send your comments to the Chairman, Dean Yannucci.

Members were reminded that the next meeting would be hosted by Cal Kappeler in Little Rock, April 6 to 9, 1986.

The new Chairman of the Audible Sound and Vibration Subcommittee will be A. Teplitsky.

The Chairman reported that the scope of various subcommittees had been changed. The following changes have taken place.

- (a) The Standards Subcommittee scope has been changed to delete reactors.
- (b) The Insulation Life Subcommittee scope has been changed to include loading of liquid filled current limiting reactors.
- (c) The Dielectric Test Subcommittee scope has been changed to include liquid filled reactors.
- (d) The Dry Type Subcommittee scope has been changed to include all dry type reactors.

The Chairman reported that a letter had been received from Sava Sherr, IEEE Staff Director of Standards, on the subject of liability protection. The Board of Directors has approved in principle a policy to indemnify named committee members involved in IEEE standards activities. A question from the floor was raised by Jim Douglass. He inquired about the coverage to be provided by IEEE. The Chairman requested that Fred Huber check into this matter and report to him.

Future meetings of the Transformers Committee will be held as follows:

Little Rock, AK	April 6-9/86	Excelsior Hotel
Pittsburgh, PA	Oct. 12-15/86	William Penn. Hotel
Fort Lauderdale, FL	May 10-13/87	Yankee Trader Hotel
New Orleans, LA	Nov. 1-4/87	Monteleone Hotel

The following new members were approved by the Adsubcom:

E. Koenig	-	Detroit Edison
B. K. Patel	-	Southern Company Services
V. Shenoy	-	Ontario Hydro
E. G. Strangas	-	University of Missouri

2. Approval of the Minutes of the St. Louis Meeting held April 17, 1985

The minutes were approved as issued.

3. Report of the Subcommittees

3.0 Administrative - D. Yannucci

For the complete report of the Subcommittee see Appendix "A".

3.1 Audible Sound and Vibration - A. Teplitsky

See Appendix "B".

The Subcommittee report was presented by Len Swenson.

3.2 Bushings - L. B. Wagenaar

See Appendix "C".

During the Transformers Committee meeting, the need for P852, "Bushings to Operate in Gas Insulated Substations" was discussed. A vote was taken and it was unanimously agreed that P852 should be rescinded.

A comment was made by C. C. Honey to the effect that the acceptable RIV level for bushings, as given in IEEE 24, is far too high.

John Easley also made some comments to the Transformers Committee relative to bushings. These are contained in Appendix "D".

Russ Minkwitz asked whether circuit breaker bushings were included in the scope of the Bushing Subcommittee. He was informed that oil to air circuit breaker bushings are included but SF₆ to air are not included.

3.3 Dielectric Tests - L. S. McCormick

See Appendix "E"

During the Transformers Committee meeting, two questions arose pertaining to converter transformers. These were:

- Mr. Yasuda asked whether pollution problems on converter transformer bushings were being considered in the scope of converter transformer work.
- Bill McNutt asked that the scope for a converter transformer document be defined.

Bill Kennedy agreed to prepare a scope to be presented to the Adsubcom for consideration at the Little Rock meeting.

3.4 Dry Type Transformers - R. E. Uptegraff

See Appendix "F"

3.5 Instrument Transformers - R. B. Stetson

See Appendix "G"

3.6 Insulation Life - C. J. McMillen

See Appendix "H"

3.7 Insulating Fluids - H. A. Pearce

See Appendix "I"

C. C. Honey raised a question concerning insulating oil and its environmental acceptability. It was stated that all oil suppliers agree that mineral oil does not have an environmental problem, but it is on a list of fluids which must be labelled when placed in a container, such as a steel drum. The reason for this is that mineral oil may cause dermatitis if it contacts skin. However, this rule does not apply to an oil filled transformer but only to containers in which oil is being shipped to a user.

3.8 Performance Characteristics - J. D. Borst

See Appendix "J"

3.9 Recognition and Awards - W. J. McNutt

See Appendix "A", Item 13.

3.10 Transformer Standards - L. R. Smith

Ray Smith was not able to attend this meeting due to the pressures of work. A report will be submitted at the next meeting in Little Rock.

- Working Group on Revisions to Test Code for Shunt Reactors (C57.21) - Jack McGill - See Appendix "K"

- ANSI Standards Status - J. C. Dutton
(See Appendix "A", Enclosure II)

The Transformers Committee was asked to review and reaffirm C57.12.70, "Connections" and C57.12.80, "Terminology". C57.12.70 is not an IEEE Standard and will be referred to ANSI for reaffirmation. However, C57.12.80 is an IEEE responsibility. During the Transformers Committee meeting John Dutton moved that this standard be reaffirmed. The vote was unanimous in favour of reaffirmation. John Dutton also moved that C57.13.1978, "Instrument Transformers" be reaffirmed. The vote was unanimous in favour of reaffirmation.

It was noted that with the publication of the latest version of C57.12.00 and 12.90, IEEE 262B and C57.12.14 will be redundant. The "Forward" of C57.12.00 and 12.90 will be modified to state that IEEE 262B and C57.12.14 will be rescinded.

3.11 West Coast - H. Johnson

See Appendix "A", Item 7(b).

4. Reports of Liaison Representatives

4.1 EPRI - See Appendix "L"

4.2 IEC TC14 and 14B - See Appendix "M"

4.3 ANSI C57.12.2 Subcommittee on Distribution Transformers

See Appendix "N"

4.4 ANSI C62 and IEEE SPDC - See Appendix "O"

4.5 ANSI C89 - See Appendix "P"

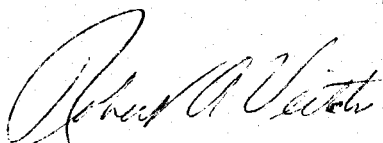
5. Technical Papers for Future IEEE/PES Meetings - O. R. Compton

See Appendix "A", Item 9

6. New Business

As there was no new business raised at the meeting, it was adjourned.

Respectfully submitted,



Robert Veitch,
Secretary.

RV:pm

APPENDIX "A"

MINUTES OF MEETING

ADMINISTRATIVE SUBCOMMITTEE

IEEE TRANSFORMERS COMMITTEE

TORONTO, ONTARIO.

MONDAY, OCTOBER 28, 1985

ATTENDANCE

D. Yannucci	-	Chairman
O. Compton	-	Vice Chairman
R. Veitch	-	Secretary

MEMBERS

J. D. Borst
J. C. Dutton
L. S. McCormick
H. Johnson
H. Pearce
R. Stetson
W. McNutt
L. Wagenaar
C. J. McMillen
R. E. Uptegraff

GUESTS

C. Kappeler
F. Huber

Administrative Subcommittee

The Adsubcom met at 7:00 p.m. on Monday, October 28, 1985 with 13 members and two guests present.

1. Introductions were made.
2. Minutes of the St. Louis meeting were approved as written.
3. Review of PES Standards Coordinating Committee Activity - Olin Compton

Olin has recommended that Ray Smith be appointed our representative on the PES Standards Coordinating Committee as this will allow us to centralize our standards activity. Ray has been approached and he will confirm if he is able to attend the PES SCC meetings.

4. Review of Technical Council Activities - Dean Yannucci

Dean's report of the Technical Council Meeting of July 15, 1985 is attached. (See Enclosure I).

Item 2 of this report, concerning the waiving of the five year membership requirement for election to Fellow grade under certain conditions, will be read at the Main Committee meeting.

Item 17C, the Switchgear Committee's proposal to invite students to their technical meetings, was discussed. Olin Compton commented that many of our meetings would not "turn-on" students to the transformer industry. There was general agreement that inviting students to our technical meetings was not recommended. It was agreed that this subject would be raised again prior to the next symposium.

5. Review of Standards Project Status - Ray Smith

Ray Smith was not able to attend the Toronto meeting due to the pressures of work. A report will be submitted at the next meeting in Little Rock.

6. Review of ANSI Standards Status - J. C. Dutton

A review of ANSI standards status was presented by John Dutton. (See Enclosure II).

The copies of C57.12.00 and 12.90 now being balloted by the ANSI C57 committee, require some editorial changes. These will be returned to the transformers Committee for correction. They will then be resubmitted to C57 for balloting.

It was agreed that the Subcommittee Chairmen will review all new standards to ensure editorial correctness prior to forwarding to the Standards Coordinating Committee. This procedure will be added to the Transformers Committee's operating manual. It was noted that a procedure already exists for Working Group Chairmen to review galley proofs of new standards prior to printing.

The Transformers Committee has been asked to review and reaffirm C57.12.70, Connections and C57.12.80 Terminology. C57.12.70 is not an IEEE standard and will be referred to ANSI for reaffirmation. C57.12.80 is an IEEE responsibility and John Dutton will ask for reaffirmation at the main Transformers Committee meeting.

It was also brought to the Adsubcom's attention that C57.12.14 and IEEE 262B will no longer be required after C57.12.00 and 12.90 are reissued. The forward of C57.12.00 and 12.90 will be modified to state that C57.12.14 and IEEE 262B will be rescinded.

7. Subcommittee Activities Discussion

(a) Insulating Fluids - Henry Pearce

It was proposed that a symposium on the "Interpretation of Transformer Gas Analysis" be presented at the Pittsburgh meeting (October, 1986). This would cover the analysis of gas in operating transformers. The symposium was approved.

(b) West Coast - H. Johnson

Herb Johnson pointed out that the West Coast Substation Subcommittee has prepared a "Fire Protection Guide" for substations. The West Coast Subcommittee would like to prepare a similar guide for transformers. Adsubcom recommended that the scope include both indoor and outdoor substations. Herb Johnson will review this recommendation with the West Coast Subcommittee and if they agree with the scope, they will prepare and submit a PAR.

(c) Dry Type - Roy Uptegraff

Roy reviewed his letter of October 14/85 on the subject of Dry Type Reactors (copy attached - Enclosure III). It was agreed that the scope of the Dry Type Subcommittee be modified to include dry type reactors, both current limiting and shunt. Sound levels of dry type reactors will remain the responsibility of the Audible Sound Subcommittee.

(d) Performance Characteristics - John Borst

The Subcommittee was asked to provide an interpretation of Section 5.3.2.3 of C57.12.90 with regard to the location of voltmeter leads. An interpretation was prepared and sent out to the Subcommittee for ballot. The interpretation, ballot results and comments are given in Enclosure IV.

It was pointed out that when an interpretation is required, the procedures set by the IEEE Standards Manual should be followed. A task force should be set up with representatives from users, manufacturers and general interest groups. This task force should then provide the interpretation.

As reported in the minutes of the St. Louis meeting, a letter was submitted by Mr. C. J. Blattner of Niagara Mohawk to Olin Compton, outlining their concerns regarding apparent inconsistencies in labeling of on load tap changer positions. John Dutton has a draft of a proposal which he hopes will address this problem. This will be reviewed with John Borst.

(e) Bushings - L. Wagenaar

The Bushing Loading Guide (P757) has been approved by the IEEE Standards Board as a trial use guide.

The Transformers Committee should continue to work towards getting bushings into C57.

(f) Instrument Transformers - R. Stetson

The Subcommittee is working on a draft guide for measuring and detecting partial discharges in instrument transformers. This draft is almost complete. This can be done independently of the work being done for the measurement of partial discharges in power transformers and dry type transformers.

C57.13.1978 Instrument Transformers, is due for reaffirmation. This should be done by letter ballot to the subcommittee.

8. Liaison Representative

Dean Yannucci received a letter from J. A. Mambuca concerning the development of design test standards for metal oxide dead front and under oil distribution arresters. (Enclosure V). We will not have liaison with the metal oxide dead front arresters but Chuck McMillen will be our liaison representative for MOV under oil distribution arresters. John Borst will inform Mr. Mambuca of this decision.

Ed Taylor, Chairman of the T&D Committee is requesting liaison for IEEE 32 defining ratings of grounding devices. Roy Uptegraff will look for a volunteer in the Dry Type Subcommittee.

9. Technical Papers for Power Group Meetings - O. Compton

A report was submitted by O. Compton. (See Enclosure VI). Olin also reported that in 1986 the number of published transaction pages would be limited to 4000. Publications will be divided into three groups:

- Power Systems Engineering
- Power Generation
- Power Delivery

10. Future Transformer Committee Meetings

The date and location of the Spring 1987 meeting has been set. It will be held at the Sheraton Yankee Trader in Fort Lauderdale FL, May 10 to 13.

11. Committee Membership Nominations

Four new members were approved by the Adsubcom.

- B. K. Patel - Southern Company Services
- E. G. Strangas - University of Missouri
- V. Shenoy - Ontario Hydro
- E. Koenig - Detroit Edison Co.

12. Committee Finances and Meeting Arrangements

Dean Yannucci is concerned about attendance at the main committee meeting dropping off after the coffee break. He has asked for suggestions to rectify this situation. Dean will make an appeal for the Arkansas meeting.

All agreed that Charles Mitchell's, "Meeting Host Procedures Document" was a good guide for meeting hosts.

13. PES Awards - Bill McNutt

The October 24 deadline for the submission of recommendations for PES awards was missed.

The deadline for the Committee Recognition Award is November 1. Recommendations are required immediately.

Dean Yannucci will send Bill McNutt a list of "Fellow" members of the Transformer Committee.

Bill McNutt will ask the main Transformer Committee for Fellow nominations. These will be strictly confidential.

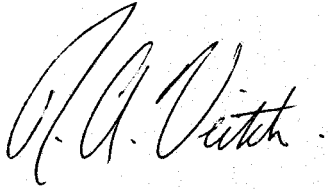
14. Other Business

The new chairman of the Audible Sound Subcommittee will be Dr. A. Teplitsky.

Dr. R. Malewski has proposed that the Transformers Committee co-sponsor a panel discussion on "Digital Wattmeters for Loss Measurements in Power Transformers" during the 1986 Winter Power Meeting of the PES in New York. (See Enclosure VII). This was accepted by the Adsubcom.

Dr. Malewski has also proposed that the Transformers Committee support a seminar on Testing Techniques for Transformers at the summer PES meeting in Mexico City. Dean Yannucci will contact Malewski to obtain clarification of his proposal to try and determine if it is acceptable. Little enthusiasm for a seminar was shown at the Adsubcom meeting.

All Working Group chairmen have received a letter from Sava Sherr on the subject of Liability Protection for IEEE Projects. (See Enclosure VIII) It was agreed that Robert Veitch will send Mr. Sherr a copy of the Transformers Committee invitational list. No other action would be taken at this time.



R. A. Veitch,
Secretary - Adsubcom.

RAV:pm

**PES TECHNICAL COUNCIL
JULY 15, 1985, MEETING**

PES ADCOM MEETING - April 17, 1985

1. For the 1985 Summer Meeting only, to authorize up to \$500 of meeting funds for a Power Engineering paper contest to be administered by the meeting committee. The winner must be an IEEE Student Member.
2. At its February 23-25, 1985, meeting, the IEEE Board of Directors accepted the intent of a request that a second paragraph be added to the existing IEEE Bylaw regarding Fellow qualifications. The added paragraph would waive the 5-year membership requirement for election to Fellow grade under certain conditions, all of which have to be met. The conditions are as follows:
 - a. The nominee be a Senior Member.
 - b. The nomination be submitted within 2 years of the formation of a new Section in an area in which the members have not been members of a Section previously.
 - c. The Fellow recommendations by this process not be counted within the six-tenth of one percent of the number of Senior Members limitation.
 - d. The recommendations be made by the Fellow Committee through the usual process.
 - e. The nominee receive a 3/4 affirmative secret vote of the BOD.

Concerning the alternate method for election to Fellow grade: To direct the President and recommend to the Division VII Director that they argue for a cap on the Fellows elected by this alternate method of 10 percent of the total Fellows elected in the year.

3. To continue the present Power Engineering Society dues schedule for 1986.

The following items were discussed:

1. The future of the Environmental Quality Committee was questioned during a TAB triennial review. Jack Cassaza has been appointed Chairman. A task force has been established to evaluate the Environmental Quality Committee; President Wagner is on this task force. W. R. Tackaberry attended the last meeting of the Environmental Quality Committee and indicated that transmission lines and acid rain were among the subjects discussed. The task of the committee has been described as "impossible."
2. E. F. Chelotti continues as a representative to the IEEE Standards Board.

Enclosure I

3. The IEEE Awards and Recognition Committee is considering an amendment to the IEEE Constitution to indicate that recognition of significant contributions is a part of the purpose of IEEE.
4. A special committee is considering the possibility of an IEEE Annual Meeting, bringing together the various Societies for a prestigious meeting.
5. A brief article will be prepared for the PES Review indicating there will be no dues increase for 1986.
6. A check for \$9,442.57 has been received by the Power Engineering Society as the PES part of the surplus from the recent Joint Power Generation Conference.
7. Consensus was reached that a new policy regarding the use of audio visual equipment is needed. The use of overhead projectors, VCR's, etc., at Society meetings needs to be clarified. Chairman Denbrock has asked the Technical Council Sessions Improvement Committee (R. W. Flugum) to develop a recommended policy before the Summer Meeting, so that it might be reviewed and adopted at that time.
8. The new PES publication policy has been accepted by the TAB Finance Committee and the TAB Publications Committee.
9. Work is progressing on the exchange of prize papers with Japan, England, and Australia. England and Australia want abstracts only.
10. The Authors Guide needs to be updated. The new guide should indicate what publications are archival, thus acceptable for citing as references in IEEE papers.
11. There was request for approval by the Technical Council of the public information paper, "Corona and Field Effects," paper. Publications Department Chairman Sharp will send copies to Technical Council Secretary Gaibrois to circulate for approval. (Note: Technical Council approved this paper on June 10, 1985.)
12. Name Changes: AdCom, Chapters Representative. Very brief discussion. Only name suggested for AdCom was Executive Board. Some suggestions for Chapters Representative were given. This subject will be on the agenda for the Summer Meeting.
13. IEEE/CIGRE, IEEE/CIRED Relationships. It would be desirable to exchange membership lists between IEEE and CIGRE down to the working group level. It would be desirable to review and update the IEEE/CIGRE agreement of cooperation. There was discussion regarding the possibility of formal exchange of information between IEEE and CIGRE working groups. Regarding IEEE/CIRED cooperation, Mel Olken (IEEE Staff) was to explore this and should be contacted. (Note: July 29, 1985 - Mel Olken is pursuing corresponding membership for the U.S., the only membership available for countries outside Europe, excluding Austria and Finland, which have Associate memberships.)

14. Tutorial course fees are per Attachment A.
15. Due to confusion on IEEE policy, Adcom will review the need for policy on PES information and position papers.
16. The formation of a Fellows Nomination Committee headed by W. McNutt was described to the Technical Council.
17. Action Request Items
 - a) New Members for SC23 - (Attachment 5a)

The IEEE Standards Coordinating Committee on Dispersed Storage and Generation (SCC-23) is soliciting members for a working group to develop a new recommended practice on the "Electrical Design and Operation of Wind Farm Generating Stations."
 - b) One-Man Tutorial Effectiveness Versus Commercialism

The TC majority agreed that one man tutorial does not necessarily result in commercialism and can be effective. A decision will be made as the situation arises, since it depends on the individual and subject.
 - c) Student Interest

P. Lyons discussed the Switchgear Committees' proposal to invite students to their technical meeting and dinner in Milwaukee during September 1985. This student meeting was discussed and approved by the Milwaukee chapter chairman. The Switchgear Committee plans to do this on a yearly basis to inform students what is new and exciting in the power industry. P. Lyon suggests that maybe some of the student slide material assembly by H. Fiedler could also be used at this session. Presentation should not be too technical and at the student level.

P. Lyons will report on their first student meeting at the next TC meeting.

- d) EMP Conference Call for Papers
C. Wagner suggested that the PES stay away from co-sponsoring the conference, which would entail reviewing all papers and participating in the expense of the conference.

Don Volzka received the request to participate and the TC agreed that we should be involved.

T. Balaska agreed with C. Wagner's position and quoted from the PES Directory the difference between "Participation" and "Cooperation".

Participation: Direct involvement in the organization of the technical program as well as willingness to assist with publicity and encourage individual members to submit papers or attend. There is no responsibility in respect to either administration or financial areas associated with the meeting.

Cooperation: Willingness to assist with publicity and encourage individual members to submit papers or attend but does not involve any administrative financial or technical program responsibilities

A motion was made and passed that PES will cooperate with the EMP Conference which will take place in New Mexico May 19-24, 1986.

Don Volzka will provide the information needed for C. Wagner to officially respond.

- e) Support of Symposium on Gaseous Dielectrics

Motion was made and approved that PES cooperate in the fifth international Symposium on Gaseous Dielectrics, May 3-7, 1987 in Knoxville, Tenn. C. Wagner will inform D. W. Bouldin, Symposium Secretary.

- f) Support of "Second International Conference on Developments in Distribution Switchgear"

Motion was made and approved that PES cooperate in the IEEE Conference, May 1986. P. Lyons will submit all information necessary for C. Wagner to reply to Joanne Sutcliffe, conference organizer, that the Switchgear Committee of the PES is willing to cooperate at this conference.

- g) Joint Reliability Conference Co-Sponsorship

J. Morgan withdrew this request as he had insufficient information.

- h) Substation Committee Action Request

Since all ballots concerning two new scopes were not received, and since the TC Task Force on Procedures and Organization duty is to coordinate scopes between Technical Committees, it was agreed that the secretary will forward all ballots and summaries to J. Hagge.

i) Paper Quotas - Deferred Papers

The pro and con of paper allotment and quality of the paper as well as deferral of good technical papers was discussed at long length. It was then agreed that these matters should be resolved Wednesday in the Publication Committee meeting.

j) Special Paper Session T&D Conference

D. Wilson proposed that the T&D committee sponsors a Special Paper Session. This session would be comprised of practical papers. He requested approval from the Technical Council that a trial session take place at the T&D conference in Anaheim, CA in 1986.

There would be two sets of papers 1) the regular technical papers which are for sale and published in the transactions and 2) the special papers which cover the state of the art. These papers would be provided by the authors and would also be available through IEEE.

E. Yasuda brought up the point that grading papers for the T&D conference is difficult because the regular IEEE Power meeting papers have to be graded simultaneously and additional papers would result in hardship to the reviewers. It was brought out that the hardship is the result of the scheduling of the T&D conference but that it only occurs every 2-1/2 years.

Tom Sharp indicated that changing the date of the T&D conference could not be done quickly since the meeting space and hotel rooms are already committed.

If the T&D committee experience with special papers takes hold, conceivably all committees may request a session with special papers and only those types of papers will be presented at future T&D conferences.

C. Wagner reiterated again that transaction papers are not supposed to be purely technical papers but also practical papers. He has tried to bring this point across, so far without much success. It was stated that this will be emphasized in the revised paper review form.

A call for special papers in conjunction with the call for the regular papers will have to be made. The request for special papers however will not make the first advance call but the second call for papers.

k1) EEI Representatives and the Vote they Possess

It is the consensus of the Technical Council that each PES member has only one vote. If someone accepts to represent the EEI his vote should only reflect the EEI directive.

2) IEEE Electro Technology Review

Tom Pinkham introduced a new publication entitled IEEE Electro Technology Review. The first publication dated 1984 was published June 13, 1985. This review is composed of 32 pages with articles of one to three pages, including 15 sections. In the first publication there were two articles on power systems and applications.

The question was: should PES participate? It was suggested that members of each committee be alerted to the need of short articles on up-to-date subjects written in layman's language.

Kathy Lavin and T. Pinkham will get together to supply each committee chairman a copy of this review and the deadline for the 1985 edition articles. (Amorphous metal may be a possibility.)

3) Individual Learning Packages (Attachment 5m3)

Dr. Merle M. Watley, manager of the System Technology Laboratory is soliciting for authors to produce learning packages. Dr. Watley is on the IEEE Educational Activities Board:

They are looking for the production of more learning tapes. An author can determine his own subject and negotiate with the IEEE as to their acceptability. To produce a tape, about 200 - 8-1/2 x 11 printed pages are needed, which in turn will be audio-taped. This will result in a student involvement of 80-hours of study.

The typical cost of the tape would be \$179 - for members and \$225 - for non-members.

The author of the tape will receive 8% of the first \$10,000 and up to 30% above \$110,000 in sales.

18. Technical Publications Committee (W. Elmore)

- a,b) The Publications Committee will meet on Wednesday July 17, 1985 and every TC member is invited to attend. Specifically the revisions of the publications guide will be discussed in relation to the publications policy. Paper review forms plus declaration of intent forms will also be reviewed.

DRAFT 1 Ballot Comments:

Approved Comments:

1. Suggest changing "voltmeter leads"... to read "voltmeter measuring leads"... in first sentence of 5.3.2.3.
2. In (1), I^2R should be written I2R.
3. I believe the purpose of paragraph 5.3.2.3 is to assure that when using the voltmeter ammeter method to measure resistance, the voltage drop measured will not include the resistance of the ammeter and its leads (i.e. the "current carrying leads"). This is especially important when measuring the low resistance of transformer windings. The interpretation should emphasize, however, that Paragraph 5.3.2.3 applies to the voltmeter ammeter method. Mr. Blythe's letter describes connection points of a DC resistance bridge which is a mulling device of relatively low current. I fully agree with the four considerations contained in the interpretation but question their applicability to the resistance bridge method.

Not Approved Comments:

1. This negative vote reflects the the opinion that the resistance measurement should be taken at the external bushing terminals. In addition to the four considerations listed on Draft 1, a further consideration is being able to detect a poor electrical connection that may develop during the temperature rise test. Any significant increase in the room temperature resistance after the unit has completely cooled down should be investigated. If the resistance is measured directly at the start/finish of the winding conductors, a poor connection could go undetected. Since the applied power would be heating the joint instead of the winding, it would affect the temperature rise results as well. In this view the word TERMINALS as used in 5.3.2.3 means the external bushing terminals, and the phrase "current-carrying leads and their contacts and of extra lengths of leads" refers to external leads and external connections. Thus the term "average winding temperature" would have to be defined "as determined by the resistance change method," where the resistance is taken at the external bushing terminals.
2. The original statement in 5.3.2.3 was to warn people with automatic test equipment against including part of their test equipment in the measurement. The measurement should be made at the point where the user will make his connection. Measurement of temperature of various parts of a conductive circuit are interesting, but should be relegated to the average vs hot spot conditions.
3. Your item (1) might be worded such that it is consistent with the first paragraph of C57.12.90 Section 5. That lists 3 purposes for resistance readings:
 - (1) I^2R loss measurements
 - (2) Thermal measurements
 - (3) Damage assessment

Location of the measuring leads should be at the bushings for (1): preferably at the bushings for (2) unless better windings rise readings could be obtained at the winding leads under certain conditions; and wherever necessary for (3) depending on the condition.

There are also certain transformer configurations such as LTC units with auxiliary windings and series transformers which may not have certain leads available externally for direct resistance measurement for I^2R losses. In such cases those winding resistance measurements must be made at the appropriate winding leads either before or after the unit is tanked.

I feel that resistance measurements are much more complex than the data in C57.12.90, Section 5 indicates. A lot more tutorial data needs to be included and your endeavor is much needed. I would ask where the data will be placed ultimately. If it is to be a part of C57.12.90 your task is going to be a little harder. If it is to be a free standing interpretation, where will it be located?

4. This might be possible for distribution transformers if a test was made with the cover removed. However, for power transformers it seems to be very impractical. I would recommend eliminating the entire sentence
5. Delete last sentence - inconsistent with Note 1.
6. My reason for not approving Draft 1 of the interpretation is that I believe other factors should be considered at this time. In my experience, many manufacturers place their voltage leads at the start and finish of the winding to obtain the lowest resistance value. This requires that tank manholes be left open during heat-run tests for quick accessibility. Leaving manholes open can distort the results of dissolved-gas-in-oil tests which are becoming more a part of heat-run and overload testing. Leaving manholes off also will distort other important test parameters in overload testing, such as nitrogen gas high pressure and bubble evolution.

I recommend that these factors be included in the list of considerations to be met, as they will in the future become more and more important.

Performance Characteristics Subcommittee
IEEE Transformers Committee
8-13-85



THE CLEVELAND ELECTRIC ILLUMINATING COMPANY

P.O. BOX 5000 - CLEVELAND, OHIO 44101 - TELEPHONE (216) 622-9800 - ILLUMINATING BLDG. - 55 PUBLIC SQUARE

Serving The Best Location in the Nation

October 11, 1985

Mr. D. A. Yannucci
Westinghouse Electric Corp.
651 Holiday Drive
Pittsburgh, PA 15220

Dear Mr. Yannucci:

IEEE SPD Committee Activity

I am chairman of Working Group 3.3.10 (IEEE SPD Committee) dealing with "Distribution Arrester Durability and Protective Characteristics." We have recently been assigned to develop design test standards for metal oxide dead-front and under oil distribution arresters. At our September 1985 meeting, I established two ad hoc task forces within my working group to work on these standards. The chairman of the task force on deadfront arresters is John DuPont and the chairman of the task force on under oil arresters is Mike Hirakami.

Your Transformer Committee may have an interest in these activities. If so, you are most welcome to have representation on one or both of these task forces. Please contact the chairmen directly if representation is desired (see below). They have indicated plans to accomplish their work through correspondence rather than meetings in order to alleviate travel expense. This should lighten the burden for all who participate on such industry activities.

J. P. DuPont
RTE Corporation
1045 Hickory St.
Pewaukee, WI 53072
1-800-558-2192

M. Hirakami
General Electric Company
Bldg. 2, Room 507
1 River Road
Schenectady, NY 12345
(518) 385-3972

Sincerely yours,

J. A. Mambuca
Chairman W.G. 3.3.10
IEEE SPD Committee

cc: J. P. DuPont
M. Hirakami

Enclosure II

REPORT OF THE TECHNICAL PAPER COORDINATOR
OLIN COMPTON

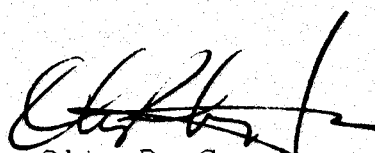
Twenty papers were received for review for the Winter Power Meeting. The forced rejection rate was 50%. Ten papers were chosen for presentation.

Two 5 paper sessions are scheduled for Thursday, February 6, 1986 at the Winter Power Meeting. Of the remaining ten papers, ~~four~~^{two} were rejected outright and ~~two~~^{two} were rejected for revision, but will be reconsidered for future meetings if revised.

I want to express my appreciation to those of you who responded so well to my hurry-up requests for paper reviews. Unfortunately, a number of papers arrived while I was in Europe and my office was being moved. As a result, some reviews were requested awfully near the cut-off date.

If we receive a large number of papers for future review, I propose to parcel them out to the appropriate subcommittee chairman with the request that they, in turn, assign them to knowledgeable subcommittee members for review. This has been done by other committees with considerable success.

We continue to receive papers from countries other than the U.S. which are confusing due to the word selection and grammatical structure of the translated English. In addition, we are finding that frequently discussion is impossible even when the presentation is adequate. This apparently is the result of the use of a phoentic English used for presentation. These problems must be overcome if the total presentation is to be successful. Your comments and advice would be appreciated.



Olin R. Compton
10/20/85



POWER
ENGINEERING
SOCIETY

Please address reply to:

October 9, 1985

Mr. D. A. Yannucci
Westinghouse Electric Corp.
651 Holiday Drive
Pittsburgh, P.A. 15220
U.S.A.

Dr. R. Malewski
H.V. Laboratory
1800 Montée Ste-Julie
Varenes, Qué. Canada
JOL 2P0

Dear Mr. Yannucci:

Power System Instrumentation and Measurements Committee intends to organize a panel discussion on "Digital Wattmeters for Loss Measurements in Power Transformers" during the 1986 Winter Power Meeting of the PES in New York.

We would like to co-sponsor this panel with the Transformer Committee, since the subject may attract an audience composed of people active in the transformer testing area. In fact, one of the speakers Mr. Sam Metha has been a prominent member of your Committee and his contribution will link the practical aspects of loss measurements to the more specialized analysis of different wattmeter characteristics.

At this stage I am soliciting your co-sponsorship of the panel as well as a promotion of this event among the attendees of the Transformer Committee Meeting in Toronto.

Please let me know your decision in this matter.

Sincerely

Dr. R. Malewski
Secretary, PSIM Committee

RM/lc
03-10-09.LET

Enclosure III
Power and Life



POWER
ENGINEERING
SOCIETY

Please address reply to:

Panel discussion on:

Digital Wattmeters for loss measurements in power transformers

Chairman: Dr. R. Malewski, IREQ, Varennes, Qué. Canada

- Panelists:
- Mr. S. Metha, ASEA, Waukesha, Wisconsin
"Power transformer loss measuring technique"
 - Dr. K. Clarke, Clarke & Hess, New York, N.Y.
"Theoretical aspects of low power factor measurements"
 - Dr. E. So, National Research Council, Ottawa, Canada
"Thermal and time division multiplier type wattmeters"
 - G. Stenbacken, National Bureau of Standards, Washington, D.C.
"Sampling type wattmeters"

The panel discussion will be organized during the PES Winter Power Meeting 1986 in New York, N.Y. and will be jointly sponsored by the Power Systems Instrumentation and Measurements Committee and the Transformer Committee.

01-10-09.TXT

IEEE

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.
345 EAST 47TH STREET, NEW YORK, N.Y. 10017, U.S.A. TELEX 237936

Sava I. Sherr
Staff Director of Standards

(212) 705-7966

October 22, 1985

L.B. Wagenaar
American Electric Power
One Riverside Plaza
Columbus, OH 43216-6631

SUBJECT: Liability Protection for IEEE Projects

Dear L.B. Wagenaar:

The Board of Directors, at its last meeting, approved in principle a policy to indemnify named committee members involved in IEEE Standards Activities. This would provide personal protection in case of legal action.

It will be necessary to compile a list of participants who will be covered by liability insurance. Such participants shall be required to comply with the procedures established by the IEEE Standards Board and reviewed by IEEE legal counsel.

As a personal contact on projects within the scope of the Power Engineering Society, please forward to my office the following information no later than 15 November.

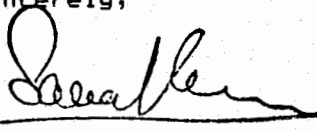
Names and addresses of the members of your Working Group, parent Subcommittee, parent Committee and/or sponsoring Committee.

Identification of the project(s) involved by name and project number.

We assume that these are the people who have legal exposure in the matter. If you feel that there are others in your area, please advise us on a separate list and let us know in what manner they are involved.

Thank you for your prompt attention to this matter.

Sincerely,



Sava I. Sherr
Staff Director, Standards

Enclosure VIII

The committee will also be looking at time limits for the various phases of paper approval. For discussion there is presently a three week limit. Any discussion received beyond that time will be sent back to the discussor with a note to the effect that since he did not meet the deadline his discussion cannot be accepted. The alternative would be to accept them slightly past the deadline, forwarding them to the author with the understanding that his reply time would be shortened.

If the author was late however there would be no assurance that discussion and reply would be printed on time.

W. Elmore has some misgiving of the second method and favors a fixed deadline.

If the time is too short he favors extending it beyond the three weeks. The mailing time, domestic or foreign, should not be a consideration since the discussions can be handed over to the session chairman. (perhaps 5 weeks)

The committee will also discuss the 4500 pages allotment and review the PES by-laws to see what might need to be changed to conform with the new publications policy. The change is minimal with some suggested rewording.

The Publication Committee will be asked to vote on the changes during the meeting.

W. Elmore made a motion to have advance approval of the Technical Council, in case the Publications Committee vote is in the affirmative, and to proceed with the proposed changes through Mr. Fitzgerald, chairman of the Constitutional By-Laws to send it through Ad. Com.

The Technical Council approved the motion to accept the changes worked upon and approved by the Publication Committee.

c) Problems with Reviews and Discussions

An objection was voiced that T. Pruitt received rejection of his technical paper without any reasons given. When he finally did receive the review form it was incomplete.

J. Morgan stated that he knew nothing about it and had not received an official complaint.

19. Publication Affairs Council (W. P. Takaberry)

EQC requested a list of emerging technology.

20. Chapter Council (H. J. Fiedler)

Distributed two pages of the loose leaf bound PES Student Activities Program he had put together from the text and slides received from 11 out of 13 committees and asked comments concerning this program.

He was commended for the excellent job he had done.

The following suggestions were made:

C. Wagner feels that we missed the intent. That it is an excellent manual but it does not address the student technical need.

It was agreed that this is a good beginning and that whoever is going to give a presentation to the students will have the basis for it but will have to put it in student language.

After each presentation, comments as to the usefulness of the material should be reported to H. Fiedler.

H. Fiedler also decided to wait until the Educational Committee and other committees have a chance to review it and make their suggestions before being sent to all chapters.

21. Meeting Department (T. A. Balaska)

There was a formal letter of complaint by the T&D Committee concerning security and other arrangements at the conference. In addition, there was a letter of complaint from one other individual directed to the chairman of the T&D Committee, plus another letter to C. Wagner and to Spectrum.

We have to realize that the hotel was in the middle of renovations with many construction workers moving about making security checks very difficult. There were 96 sessions during the 1985 winter meeting as compared to 82 at the previous New York meeting. Therefore, seven sessions were held in make-shift areas. There was some equipment shortages with mikes and cords disappearing during the construction.

There were many discussions on security and robberies. The management committee spent considerable time in this area. The Penta Hotel had some 39 plainclothes security agents continually patrolling the corridors. Despite this, one gentleman was held at gunpoint in his room and robbed of approximately \$100.00 and a wristwatch. The hotel has reimbursed him plus an insurance claim is going on. A computer was removed from a room and a number of tv sets removed, possibly by construction people. In addition, one suitcase was removed from the lobby. It was reported that four robberies occurred but as far as could be determined there were only three incidents. (One robbery in a hotel room, one computer stolen, and one suitcase stolen). All construction should be completed by the winter 1986 meeting. Security should be tighter by that time, and while there are no guarantees against further incidents, other cities rank higher in crime rates.

22. TC Task Force on Procedures and Organization (J. W. Hagge)

a) TC Procedural Guide

There was no meeting since the last winter power meeting. We plan to have the procedural guide up-to-date to have it available to discuss how strict or loose the changes should be.

b) Reorganization of NPEC, PGC and RMC

First draft letter is out and comments were received back from all three committees. Eventually when the scopes are completed they will be brought in front of the TC for approval and then to Ad. Com.

23. Technical Session Improvement Committee (R. W. Flugum)

T. Balaska reporting. The meeting department is following our present meeting policy which is to use slide projectors for technical sessions and if requested, provide overhead viewer for working group sessions.

The TC must be aware that if they approve VCRS they will have to pay the price which is in the order of \$400-600, depending on the location. This will cause the registration fee to increase.

24. Technical Council Awards (P. O. Duncan)

a) PES Technical Awards.

The request for awards was sent to all technical committee chairmen.

b) 1985 Power Life Award.

No report.

c) J. H. Easley Distribution Award.

The T&D Distribution Subcommittee is requesting to have their own award for outstanding performance in the distribution field. This award to be given every other year was approved by F. Denbrock, TC Chairman.

25. Spectrum Review Articles

Requested that the articles for the Spectrum be sent in by the end of the year.

26. Power Engineering Education

a) Made definite progress on EPRI sponsored monograms to be used by the educators.

This is a positive solution to a long standing problem. They are on their way to produce eight topics which will be reviewed by EPRI.

- b) In response to C. Wagner's auditorial of "What is wrong with the power industry", and why can't we attract students, the committee took an informal survey of students, plus young and old engineers, and found out that the student's information about the power industry is what they read from the newspapers.

We have to come up with positive responses to this lack of information. It was first suggested to have a morning session at the general meeting but that did not pass. The second suggestion is to do a better job in describing the problem and the solutions in a position paper. The first draft of this paper will hopefully be ready for the Winter Power Meeting.

27. Task Force on Future Technical Improvement (T. Pinkham)

- a) 1986 Winter Meeting - Special Session.

A motion was made and passed that there be a special session during the 1986 Winter Power Meeting to introduce the subject of future technical development.

This session would be a panel session composed of four to five speakers each discussing a different aspect of the subject.

- b) Robotics.

There seems to be not enough interest in robotics to form a task force. It was also pointed out that this is not a new technology. The only generated interest was to invite application papers and displays for the T&D Conference in Anaheim, CA.

28. Standards Coordinating Committee (J. W. Bonucchi)

The committee met in the afternoon with 13 members present. Most of the session was spent on the scopes statements. The scopes will be forwarded to J. Hagge.

- a) Publication Standard Problems (F. A. Denbrock)

Several problems still exist relating to delays in publication of standards. Standards are still not published after months or even years after approval. They are presently working to shorten the backlog.



POWER ENGINEERING SOCIETY

PLEASE REPLY TO:

TO: Secretary, Technical Council, Power Engineering Society
FROM: Chairman, Transformer Committee
DATE: July 12, 1985
SUBJECT: Report of Transformer Committee Activities

The Transformer Committee, Subcommittees, and Working Groups met in St. Louis, MO on April 15-17, 1985 with 165 attendees.

Attached is a copy of the Transformer Committee Projects' Status.

Topics of interest from the Subcommittee are as follows:

Mr. R. C. Thomas submitted his resignation as Chairman of the Instrument Transformer Subcommittee. Mr. Ralph Stetson of General Electric was approved as the new chairman of this subcommittee.

A seminar on Transformer Loss Measurements, sponsored by the Performance Characteristics Subcommittee, will be presented at the Toronto meeting on October 29, 1985. This seminar will be based on the work of ASEA Electric and NBS.

The Dielectric Test Subcommittee has been instructed to contact NEMA to determine their intentions on revising TRI-.06, External Clearances between Live Parts.

The development of a loading guide for current limiting reactors was approved. However, the dry type reactor portion will be incorporated into the Dry Type Loading Guide, while the oil filled reactors will be incorporated into the Liquid Filled Loading Guide.

The Insulation Fluids Subcommittee recommended Standards on Askerels be dropped. This was approved.

In reference to Mr. Skiles request, Chairman of the Tutorial Sessions Subcommittee, the Transformer Committee agreed that since we had just completed a transformer tutorial, it would be too soon for a new tutorial to be prepared. A new tutorial on transformers could be considered in about three years.

A procedural document on "Meeting Host Procedures" has been developed. Final approval of this document should occur at the Fall, Toronto meeting.

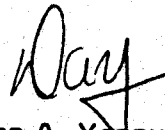
Three new members were approved to the Transformer Committee, bringing the total membership to 114.

Working Group Recognition Awards were presented to the Task Force Members on Developing a "Loading Guide for Transformers above 100 MVA." Also, two prize paper awards were presented.

A new "Fellow Engineer" Committee was established within the Transformer Committee to foster the nomination of worthy members to "Fellow Status."

Mr. O. Compton of VEPCO was identified as the Committee's new liaison representative to the Public Affairs Council.

The next Committee Meeting will be in Toronto, Ontario on October 27-30, 1985.



Dean A. Yonucci
Chairman
IEEE Transformer Committee

DAY/bvs

Attachment

ASC C57
BALLOT NO.

OR IEEE PROJ. NO.	BRIEF DESCRIPTION	IEEE STD BD SUBM.	ASC C57 BLTG.	ANSI BSR SUBM.	STDS ACT PUB. REV.	ANSI BSR APP	EDIT, TYPESET	PRINT
P353	HVACC, C57.12.55 Dry Type	N/A	C	C	Pub Rev To Finish 11/12/85			
P356	HVACC, C57.13.2 Inst Tr		Re- Bltg					
P65	ANSI/IEEE C57.12.56 Dry-Type Ins Test	C	C	C	C	C	C	IP Early '86
P93	ANSI/IEEE C57.98 Impulse Test Guide	C	C	C	C	C 8/19/85		
P784	ANSI/IEEE C57.109 Short-Cir Dur	C	C	C	C	C 8/19/85	IP	Expect in Oct
	ANSI C57.12.23 Under 1 Ø Dist Tr.	N/A	C	C	C	C 8/19/85	Editing	
	ANSI C57.12.26 Padmt 3 Ø Dist Tr	N/A	C	C	C			
	ANSI/IEEE C57.95 Load Gd Stp & Ind Reg		C	C	C	C 8/19/85		Early '86
	ANSI/IEEE C57.100 DT Therm Eval	C	C	C	C	C 8/19/85		Early '86
	ANSI/IEEE C57.12.00 Requirements	C	Bltg					
	ANSI/IEEE C57.12.90 Test Code	C	Bltg					
	ANSI C57.12.20 Pole Dist Tr	N/A	IP					
	ANSI C57.12.57 Dry Type NIW Tr	N/A	IP					

Subm. = Submitted Bltg. = Balloting IP = In Process C = Complete N/A = Not Applicable

John C. Dutton, Chairman - IEEE Delegation to ASC C57

14

IEEE-TR.C.

DA Yannucci
OR Compton
→ R Veatch
LR Smith

IEEE-NY

SI Sherr
J Gorman
F Huber
P Lange

ASC C57

R Uptegraff LS McCormick
R Ensign WJ Neiswender
R Hansen H Tucker
JV Bonucchi HD Smith

OTHER

D Kelly
V Morgan
TL Mayes
CH White

Enclosure II



THE INSTITUTE OF
ELECTRICAL AND
ELECTRONICS
ENGINEERS, INC.

PLEASE REPLY TO:

R. E. Uptegraff, Jr.
R. E. Uptegraff Mfg. Co.
P. O. Box 182
Scottdale, PA 15683

October 14, 1985

Mr. D. A. Yamucci
Westinghouse Electric Corporation
651 Holiday Drive
Pittsburgh, PA 15220

Subject: Dry Type Reactors

Dear Dean:

The Dry Type Transformer Subcommittee has been approached to consider accepting responsibility for guides and standards for dry type reactors. As reported in our minutes of the April 16, 1985 meeting in St. Louis, the Insulation Life Subcommittee suggested the Dry Type Transformer Subcommittee develop a loading guide for dry type current limiting reactors. Subsequently and following the suggestion of Mr. L.S. McCormick (I think), Mr. A.A. Kaminsky wrote the letter, enclosed, requesting the Dry Type Transformer Subcommittee undertake responsibility for contributing to the updating of ANSI C57.16-1985 (R1971) and of ANSI C57.21-1981, which cover current limiting and shunt reactors.

The Dry Type Transformer Subcommittee could function in these areas with the addition of persons having specific interest in dry type reactors, and a number of volunteers have already presented themselves. Transformers and reactors have much in common, as you know. However, there is a question of scope. Presently, there is no provision in the scope of the Dry Type Transformer Subcommittee for reactors. For that matter, although reactors are contained in the general statement of the scope of the Transformers Committee, only "Reactors and grounding transformers (jointly with Surge Protective Devices Committee)" is specifically listed. Reviewing the Working Groups with reactor involvement, one finds under the Dielectric Tests Subcommittee, a working group on dielectric tests for High Voltage DC stressed transformers and reactors and a Task Force on revision of dielectric tests of shunt reactors (liquid and dry type).

Page 1

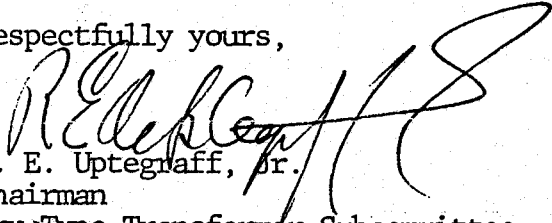
Enclosure III

October 14, 1985

Mr. D. A. Yarnucci

Under the Insulation Life Subcommittee, there is a working group on guides for loading; but as previously mentioned, this group has suggested the Dry Type Transformers Committee undertake the loading guide for dry type current limiting reactors. In short, there is no subcommittee presently established to prepare guides or standards exclusively for dry type reactors nor is the Dry Type Transformer Subcommittee qualified by scope. Therefore, if it is desirable to have the Dry Type Transformer Subcommittee undertake projects relating to dry reactors, these devices should be included in its scope.

Respectfully yours,


R. E. Uptegraff, Jr.
Chairman
Dry Type Transformer Subcommittee

REUjr/sjb

cc: R.A. Veitch
Ferranti-Packard, Ltd. ✓

Encl.

DRAFT 1 - 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 I^2R 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.

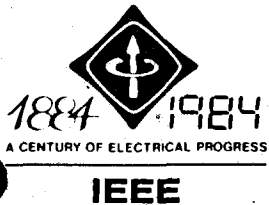
With specific regard to resistance measurement for calculation of winding temperatures, the natural, preferred location would be the external terminals for oil-filled apparatus. However, direct placement on the winding leads is acceptable provided that the above-listed considerations are met.

Performance Characteristics Subcommittee
IEEE Transformers Committee
5-28-85

Draft 1 - Ballot results:
Sent: 50 Returned: 36
 Approved: 26
 Approved with
 Comments: 3
 Not Voting: 1
 Not Approved: 6

3286e - paz

Enclosure IV



APPENDIX "B"

POWER ENGINEERING SOCIETY

TRANSFORMERS COMMITTEE
Dean Yannucci, Chairman

AUDIBLE SOUND AND VIBRATION SUBCOMMITTEE
Alan M. Teplitzky, Chairman

MINUTES OF THE MEETING OF THE AUDIBLE SOUND AND VIBRATION SUBCOMMITTEE

at Toronto, Ontario, Canada, October 29, 1985

The Subcommittee was convened by L.A. Swenson at 2:00 p.m., October 29, 1985.

The following were present:

MEMBERS

T.J. Dubois
R.S. Girgis
R.L. Grubb
H. Johnson
C.H. Millian
L.M. Nicholas
J.M. Pollitt
R.J. Ringlee
L.A. Swenson

GUESTS

R.M. Hoover
A.J. Mudge
D.A. Nordstrand
S. Palmer
F. Perri
J.R. Staines

Minutes of the last meeting in St. Louis, April 16, 1985, were reviewed and approved.

The resignation of Richard Liebich as subcommittee chairman and appointment of Alan Teplitzky as chairman were announced.

A joint meeting of this subcommittee and the working group on Mechanical and Electrical Equipment Noise was held at 8:00 a.m. of this same day. Several working group members were in attendance at this subcommittee meeting.

The subcommittee secretary will prepare and submit a "Standards Project Authorization" for revision of ANSI C57.12.90 prior to the next meeting. This will cover inclusion of a sound power level measurement for power transformers.

The secretary and chairman will further revise the chairman's proposed sound measurement standard and mail copies prior to the next meeting in Little Rock, Arkansas in April 86. Several members present supported a closer alignment to IEC 551, NEMA TR1 and ANSI C57.12.90.

Lennart A. Swenson
Secretary, Audible Sound &
Vibration Subcommittee

L. A. Swenson
Bonneville Power
Administration
P.O. Box 3621
Portland, OR 97208
PLEASE REPLY TO: (above)

APPENDIX "C"

BUSHING SUBCOMMITTEE

Report to the Transformers Committee

The bushing subcommittee met on Tuesday, October 29, 1985 with 10 members and 15 guests present. After the meeting, the following four individuals requested membership to the committee, thus bringing the membership of the subcommittee to 23:

Gerald Evans - Georgia Power
Dennis Allen - GEC Power Transformers, Ltd.
Charles Hoesel - Arizona Public Service
M. Rajadhyaksha - Square D

Draft 6 of the revision of C76.1-1976 was sent to members of the subcommittee prior to the meeting and reviewed at the meeting. Several additional changes were made and these changes will be incorporated into P21/d7. This draft will be balloted on within the transformers committee.

A comment made in one vote of the original ballot of Transformer ballot of P21/d4 was that the draw-lead material and cross section should be coordinated with the bushing and indicated. The consensus of the bushing subcommittee is that this information is required by the user but the transformer manufacturer - not the bushing supplier - determines these design parameter. It is therefore recommended this item be referred to the proper subcommittee for inclusion in C57.12.00.

The chairman of the bushing subcommittee sent IEEE a letter requesting that P757, Guide for Loading Power Apparatus Bushings, be published as an IEEE Trial Use Guide. The bushing subcommittee also urges that bushings be included in the scope of C57 as soon as possible and that a subcommittee within C57 be established for bushings. These are several items in the Bushing Application Guide, P800, which have been approved by this and other committees which await publication.

Project P852, Bushings to Operate in Gas Insulated Substations, was also discussed. Draft 1 of a guide has been written. It includes an outline of the guide and a portion of the test. Before going any further, the bushing subcommittee needs an indication from the Transformer Committee that there is a need for this document. It was decided by a vote within the Transformers Committee that Project P852 should be rescinded.

Further work on Project P800, Bushing Application Guide, was discussed. Once a chairman can be found, a new working group on this subject will be established. John Eagley has requested to be relieved as the chairman of the Working Group on Guide for Loading Power Apparatus Bushings. When the new Working Group is formed, the work remaining in John's working group will be transferred to the new working group.

The topic of field failures of bushings and correlation to factory testing was on the agenda and discussed briefly. However, time did not permit any decisions regarding future action on this subject.

L.B. Wagenaar
Chairman

APPENDIX "D"

COMMENTS TO THE TRANSFORMERS COMMITTEE RELATIVE TO BUSHINGS

About ten years ago, the Bushing Sub Committee was organized within the Transformers Committee. The objective was to merge transformer and bushing technology in order to enhance the preparation of bushing standards. Reasonable progress has been made but I would like to point out three areas where further improvement is needed.

1. ADMINISTRATION AND MANAGEMENT. When the responsibility for the preparation of bushing standards was assigned to the Transformers Committee, the management of those standards was not assigned to ANSI C57 but was left as a separate entity -- C76. In 1984 the IEEE Standards Office disbanded C76. Unfortunately, the most important document prepared by the Bushing Sub Committee -- Project 757 -- Guide for Loading Power Apparatus Bushings was left to wither on the dead vine. It is very important that the management of bushing standards be organized in ASC C57 in such a way that the Transformers Committee can keep track of their status and expedite their progress when necessary.

2. TECHNICAL GUIDANCE. One of the big stumbling blocks in the preparation of bushing standards is lack of a uniform understanding of the thermal environment of the transformer into which the bushing is being installed. Although the 65°C rise refers to average winding rise, many members of the Transformers Committee construe this to imply a 65°C top oil rise also. In some unusual cases this may be true. However, it certainly is not the case in modern FOA units. The Performance Characteristics Sub Committee should give a very high priority to the preparation of a clear guide to the Bushing Committee describing the thermal environment bushings are reasonably expected to encounter in various sizes and types of transformers.

3. PARTICIPATION. For several years ANSI C76 struggled unsuccessfully with a bushing application guide. Now that C76 no longer exists, this project is clearly the responsibility of the Bushing Sub Committee. The preparation of a bushing application guide requires expertise in three areas -- bushing design, transformer design, and transformer operation and maintenance. There is no place where this expertise is more readily available than the Transformers Committee. This is an ideal place where adequate participation of members with different areas of interest can demonstrate the wisdom of establishing a Bushing Sub Committee.

J. K. Basley
January 15, 1986

APPENDIX "E"

**MEETING MINUTES
Dielectric Test Subcommittee
Toronto, Canada
October 29, 1985**

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	
Farber, W. R.	X	
Fischer, H. G.	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	
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	
Musil, R. J.		X
Osborn, S. H.	X	
Perco, D. D.		X

<u>Membership of Record</u>	<u>Attendance</u>	
	<u>Status</u>	
	<u>Present</u>	<u>Absent</u>
Roach, D. A.		X
Robbins, C. A.		X
Saxon, W. E.	X	
Shenoy, V.	X	
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.	Kappeler, C. P.
Arnold, J. C.	Lazarz, T. J.
Binder, W. B.	Lowdermilk, L.
Boettger, W. E.	Lowe, R. I.
Boggavarapu, R. L.	Massouda, T.
Borst, J. D.	McNutt, W. J.
Bowers, T. L.	Miller, L. D.
Carter, W. J.	Moon, J. L.
Ebert, J. A.	Moore, S. P.
Edwards, E. C.	Nicholas, L. M.
Evans, C. G.	Norton, E.
Foldi, J.	Oklu, S. K.
Frazor, R. H.	Patel, B. K.
Gunnels, G.	Puri, J.
Hall, G.	Rossetti, J. R.
Highton, K. R.	Strangas, E. G.
Henning, W.	Subramanian, R.
Jacobsen, R.	Thenappein, V.
	Truax, D. E.
	Ulrich, R. F.
	Whiteley, D. A.
	Yasuda, E. J.

MEETING MINUTES

Dielectric Tests Subcommittee

Toronto, Canada
October 29, 1985

The subcommittee met at 10:00 a.m. with 35 members and 40 guests present.

The minutes of the previous meeting in St. Louis were approved as published.

The working groups reported as follows:

Working Group on Revision of Dielectric Tests - John Bergeron

The Working Group met at 3:05 p.m. on Monday with 22 members and 18 guests present. In the absence of Chairman John Bergeron, Loren Wagenaar conducted the meeting.

It was reported that C57.12.00 and C57.12.90, containing revisions on the portions dealing with dielectric requirements and tests, passed the IEEE Standards Board in June. The documents hit a snag in the ANSI Standards Board due to editorial problems with some of the tables. These problems are being resolved and the document is again moving.

Chairman Bill Kennedy reported that the Task Force on Revision of Dielectric Tests for Shunt Reactors had met earlier on Monday. The Task Force continued discussion on Draft 1 of Revision of Test Section of C57.21. Technical changes include:

1. Table 8 "Minimum Insulation Class at Neutral for Oil Immersed Shunt Reactors when Specified" will be eliminated and replaced by a statement which will be put in the text stating that the minimum low frequency test level will be 34 KV (110 BIL).
2. The one-hour test at 1.5 times maximum operating voltage will be specified by adding an additional column in Table 4 and referring to the tables in the text.
3. Discussion continued on the one hour test with respect to the substitution of three single-phase induced tests for one three-phase test on 3 phase reactors. Draft 1 proposed that a phase to phase switching impulse test be used to demonstrate the phase to phase integrity of the reactor, but this is impractical. In addition, serious problems can develop in single phase testing of three phase reactors without a magnetic return path. The section will be reworded to incorporate these changes.

At this time, about two-thirds of Draft 1 has been reviewed. The recommended changes will be incorporated into Draft 2.

Chairman Jim Douglas reported that the Task Force on External Clearance Requirements had also met on Monday. The first draft has been written and discusses the phase to phase voltages experienced in the field as well as phase to phase external clearances for 345 and 500 KV transformers. Transformers rated 765 KV and above are not addressed because there are no three phase transformers of these ratings with air bushings. Draft 2 will incorporate rationale for obtaining these voltages. The Task Force will next address transformers with 230 KV nominal system voltage. The eventual disposition of this document was also discussed at the Task Force and Working Group meetings.

The Task Force on Revision of the Impulse Guide is still being formed. John Bergeron is seeking a person to act as chairman of the Task Force.

Under new business, it was noted that the new revision of C57.12.90 only requires that partial discharge measurements be made on terminals 115 KV and above. This is the same requirement as specified by IEEE 262B. The question which arose concerns whether the LV terminals of autotransformers rated 115 KV or greater on the HV terminal and less than 115 KV on the LV should receive partial discharge measurement. One case was cited where problems were found when the HV measurements indicated no problem but the LV measurements detected one.

Discussions were also held during the subcommittee meeting concerning phase to phase testing to verify the impulse or switching surge strength. Jim Douglass' task force will discuss this at their next meeting.

Working Group on Revision of Dielectric Testing of Distribution Transformers - W. R. Farber

This group met at 1:00 p.m. on October 28, 1985. Tito Massouda of Ferranti-Packard, St. Catherines, joined the working group at this meeting bringing the membership to 19. Present at this meeting were 13 members and 15 guests.

Following the introduction of attendees, the minutes of the April 15, 1985, meeting held in St. Louis, Missouri, were approved.

Bill Henning led a discussion of Draft 3 of the proposed Distribution Transformer Production Line Impulse Test Code which is presently out for ballot of both the Working Group and the Dielectric Tests Subcommittee. Included in the ballot are a supplement to ANSI C57.12.90 and a revision to Table 14 of ANSI C57.12.00 which establishes the requirement of the mandatory test. The return date for the ballot is November 29.

A task force is presently being organized to prepare a test guide for these tests.

Chuck McMillen then discussed the results of the work he had done as a part of an EPRI study of anomalous distribution transformer failures. He discussed the responses of distribution transformers with different LV winding arrangements to current surges injected into the LV terminals. He presented failure rate data from a Southeastern utility which was identified as to LV winding arrangement.

Robert Thompson of Allegheny Power Systems reported results of a recent investigation of failure causes by his company.

Stephen Smith of McGraw Edison discussed a paper that he had recently presented at an EEI T&D Committee meeting. His paper reviewed some system application concerns relating to this subject and disputed some of the conclusions of the previous discussors.

There appeared to be general recognition in the Working Group of the difference in responses of interlaced versus non-interlaced LV windings to LV current surges. There was however a lack of agreement as to the significance of this difference on today's utility distribution systems nationwide.

It was agreed that a two hour working group meeting did not allow sufficient time to fully discuss this subject and that systems experts may also have a contribution to make. Additionally more failure data is being gathered.

The W. G. chairman will attempt to organize a full day meeting to discuss this subject before the next Transformers Committee meeting. This meeting will probably be held in Atlanta in the vicinity of the airport in early 1986. Thirteen attendees of the W.G. meeting indicate a desire to participate in such a meeting. Others having a contribution to make in the discussion of this subject would be welcome.

Working Group on Dielectric Tests for HV DC Stressed Transformers and Reactors - W. N. Kennedy

The Working Group met on Monday, October 28, 1985, at 8:00 a.m. with 8 members and 1 guest present. After the meeting, Dennis Allan requested to join, raising the total membership to 12. Final copies of our IEEE paper 85 SM 375-1 "Recommended Dielectric Tests and Test Procedures for Converter Transformers and Smoothing Reactors" were handed out, together with comments written by V. Shenoy of Ontario Hydro and the closure. The paper was presented at the Summer Power Meeting in Vancouver and was well received.

Minutes were distributed from the newly formed CIGRE joint working group on HVDC converter transformers 12/14.10. The first meeting of this group was held on March 6, 1985, and T. H. Harrison of GEC Transformers is the chairman. This group will be reviewing service experience, testing requirements, specification data, system effects on converter transformers and converter transformer effects on systems. We intend to share information with this group and work closely with them.

The remainder of the meeting was devoted to a discussion of the future work for our group. It was agreed that we should expand our recent paper as a guide for testing converter equipment, including discussions of non-dielectric subjects. Areas of change include:

A. Dielectrics

1. Expansion of voltage resistivity, time effects for oil, cellulose, and other materials such as porcelain.
2. Discussion of system voltage variation and the selection of nominal AC voltage of the valve winding for determining DC test levels.
3. Discussing potential sources of partial discharges under DC and reversal conditions, and how they differ from AC behavior.
4. Adding a section on bushing testing, recommendation of a type test for the bushing with the insulation used in the equipment, and including warnings not to interchange bushings with standard AC ones.

B. Thermal Considerations

1. Heat runs for converter transformers - how to test and how to evaluate results? We need to examine existing standards for rectifier units.
2. Thermal distribution in transformers under operation - reference to W. J. McNutt's Working Group on Harmonic Loading.

C. Core Considerations

1. Core loss due to DC current
2. Noise of core (and transformer in general) These can be based on EPRI's RP-1424-J on HVDC Magnetics.

A draft will be prepared on the dielectrics portion and distributed to the members for discussion at the next Working Group meeting next spring.

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

The Working Group met at 9:00 a.m. on 10/29/85 with 20 members and 15 guests present.

The minutes of the St. Louis meeting were approved as written.

The Task Forces for Measurement of Apparent Charge and for Acoustic Detection of Partial Discharges met on October 28. Both Task Forces had well attended meetings with good discussions.

As indicated in the minutes of the St. Louis meeting, a 5th draft of the Trial Use Guide for Measurement of Apparent Charge was prepared from decisions made at this meeting. This draft recognizes both narrow band and wide band apparent charge measurement methods. The draft was balloted within the Working Group with the following results being reported by Mr. Vaillancourt, Chairman.

Approved - 18
Approved with Comments - 5
Ballots Not Returned - 3
Not Approved - 3

All of the comments were resolved prior to the Task Force meeting. Two (2) of the "Not Approved" ballots were resolved so that these members approved the agreed-upon changes in the draft. The one remaining "Not Approved" ballot could not be resolved because the member was not present at the meeting. The draft used wording from existing ANSI standards to describe the allowable change in the measured P.D. during the one hour test. There was objection to this wording in the 5th draft. An attempt will be made to resolve this one negative ballot.

It should be noted that several unsuccessful attempts were made to contact those not returning the ballots.

The results of the ballot after resolving the issues prior to and during the Task Force meeting were as follows:

Approved - 25
Ballots Not Returned - 3
Not Approved - 1

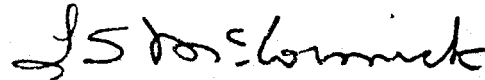
After a full review of this situation, the Working Group voted 20 to 10 to submit the 6th draft to the Dielectric Tests Subcommittee for balloting if the one remaining negative ballot can be resolved. This draft will contain all of the changes resulting from the balloting on the 5th draft.

Draft 4 of the Proposed Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil Immersed Power Transformers was reviewed at the meeting of this Task Force. Mr. Howells had made changes in line with discussions at the St. Louis meeting. He presented the changes to be made in the 4th Draft at the Working Group meeting:

- Since acoustic detection is a relatively new subject, an appendix will be added in which explanatory and instructional material will appear. The appendix will also include reference information pertaining to this subject.
- A paragraph will be added in the Guide on interpretation of acoustic test results.
- A calibration procedure for the acoustic detection system will be added to the Guide. Information on calibration of transducers may be included in the appendix.

The 5th Draft will be prepared and mailed to the Working Group prior to the next meeting. A decision on extending acoustic methods for location of PD will be made at the next meeting of the Working Group.

After the reports of the Working Groups were completed, the Subcommittee meeting was adjourned.



L. S. McCormick

11/6/85

LSM/emc

APPENDIX "F"

IEEE DRY-TYPE
TRANSFORMERS SUBCOMMITTEE
MINUTES OF OCTOBER 29, 1985 MEETING
TORONTO, CANADA

MEMBERS PRESENT

B. F. Allen

G. H. Bowers

E. C. Edwards

A. D. Kline

E. Koenig

M. L. Manning

W. H. Mutschler, Jr.

J. J. Nay

R. E. Uptegraff

MEMBERS ABSENT

S. J. Antalis

R. A. Bancroft

A. Bimbiris

F. Brutt

J. C. Dutton

G. L. Gaibrois
(Liason Member)

H. E. Gabel

A. Jonatti

N. J. Melton

S. A. Wiencek

C. R. Willmore
(Liason Member)

GUESTS PRESENT

<u>Name</u>	<u>Affiliation</u>	<u>Address</u>
C. S. Yung	Federal Pioneer	445 Horner Avenue Toronto, Canada
T. L. Bowers	Federal Pioneer	445 Horner Avenue Toronto, Canada
R. W. Simpson, Jr.	Spaulding Fibre Co.	Spaulding Avenue N. Rochester, N. H. 03867
E. Dennis Guice	Southern Transf. Co.	3015 Martin Street East Point, GA 30334
C. V. Brown	Florida Power and Light	P. O. Box 029100 Miami, FL 33102
Henry Windisch	Black & Veatch	P. O. Box 8405 Kansas City, MO 64114
Bob Grunert	Square D. Co.	P. O. Box 5002 Monroe, N. C. 28110
Walt Kendall	Square D. Co.-Sorcel	P. O. Box 0549 Milwaukee, WI 53204
Rick Marek	National Industri	2520 58th St. Hampton, VA 23661
Fred Huber	IEEE Stds. Office	345 E. 47th St. New York, NY 10017
J. H. Harlow	Siemens-Allis	P. O. Box 6289 Jackson, MS 39208
Wesley Patterson	Brown Boveri	P. O. Box 38 Bland, VA 24315
Dave Brazier	Ferranti Packard	P. O. Box 548 St. Catherines Ontario, Canada
Tom Orbeck	Dow Corning Corp.	Midland, MI 48640
Dan Rose	Trench Electric	71 Maybrook Drive Scarborough, Ont. MIV2LS
Richard Dudley	Trench Electric	71 Maybrook Drive Scarborough, Ont. MIV2LS
Alex Kaminsky	Spezielektra Corp.	22187 Michigan Avenue Suite 205 Dearborn, MI 48124
D. A. Barnard	Square D Company	P. O. Box 5002 Monroe, NC 28110
A. M. Iversen	General Electric Co.	P. O. Box 1701 Fort Wayne, IN 46804

The Dry Type Subcommittee met at 1:00 p.m. on October 29, 1985, with 11 members and 17 guests present. Following opening remarks by the Chairman and introduction of members and guest, a motion for approval of the April 16th (St. Louis) meeting minutes was made, seconded, and approved.

Working Group Reports

- 1.0 W.G. on insulation requirements for specialty transformers - Alan M. Iversen, Chairman.

This W.G. met on October 28, 1985, with 6 members and 8 guests present.

- 1.1 This initial meeting of the W.G. was originational in nature and the primary purpose of the initial meeting was to define course of action for the W.G. The W.G. last met in October, 1980. IEEE Std. 259 was re-affirmed as a result of the last series of meetings.

- 1.2 The Chairman will contact members of the Dry Type Subcommittee in an effort to recruit members to serve on this W.G. Representation from dry type specialty transformers in the U.S. and Canada, and the U.L. and CSA is desired.

- 1.3 The Chairman will draft a proposed revision of IEEE Std. 259 for comments by the W.G. The Chairman will explore combining IEEE Std. 259 and IEEE Std. 266 Test Procedure for Evaluation of Insulation Systems for Electronics Power Transformers.

- 2.0 Dielectric Problems W.G. - Jerry Corkran, Chairman.

This W.G. met on October 28, 1985, with 8 members and 17 guests present. Don Kline served as Acting Chairman in the absence of J. Corkran, Chairman.

- 2.1 The first draft of the Partial Discharge Guide was discussed.

- 2.2 The title was changed to: Guide for the Measurement of Partial Discharge in Dry Type Transformers.

- 2.3 Applied voltage and induced voltage test connections were discussed.

The measurement sensitivity will be included in the body of the guide. Test limits will be stated in C-57.12.01. Test limits will be referenced in the foreword of the guide.

- 2.4 Test procedures peculiar to cast coils will be incorporated into the proposal guide.

- 3.0 W.G. on Standards for Dry Type Transformers Incorporating Solid Resin Encapsulated Coils - Egon Koenig, Chairman.

This W.G. met on October 28, 1985, with 10 members and 12 guests present. R. Marek and R. E. Gearhart were added as new members of the W.G.

- 3.1 W.G. ballots on the revision of C-57.12.01 Draft "O" were discussed. W.G. agreed to change the title as follows: General Requirements For Dry Type Distribution and Power Transformers Including Those Incorporating Solid Cast and Resin Encapsulated Windings.

- 3.2 Majority of meeting time was used discussing comments made by W.G. members. Draft 1 incorporating those comments will be prepared prior to the Little Rock, Arkansas meeting.

- 3.3 Chairman asked W.G. members to review in detail the Agenda items submitted by the Task Force Group. Written comments should be submitted to D. Barnard.

- 4.0 W.G. on Revision of ANSI C57.96 "Guide for Loading Dry Type Transformers" - Bill Mutschler, Chairman.

This W.G. met on October 28, 1985, with 9 members and 10 guests present.

- 4.1 W.G. and Dry Type Subcommittee ballot results were reviewed.

Approved - 13
Negative - 3
Not voting - 3

The 3 negative ballots were concerned with describing the basis for the Arrhenius equations used in the guide. "Actual aging" rather than "relative aging" will be used in the guide. A discussion of this point will be included in the foreword for clarification.

- 5.0 W.G. on Thermal Evaluation, George Bowers, Chairman.

W.G. on Guide for Thermal Evaluation for Insulation Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers met on October 28, 1985, with 12 members and 11 guests present.

5.1 The W.G. ballot of the above document resulted in 14 affirmative (2 with comments), 2 not voting, and no negative votes. The comments were added to the foreword section and the document re-balloted in the Subcommittee. Results were 14 affirmative (3 with comments), 4 not voting, and no negative ballots. The document will be re-balloted in the Subcommittee. If successful, balloting will proceed to the Transformer Committee level as soon as an official project number is assigned.

5.2 Task Force on Flammability/Toxicity was attended by 23 people. The next meeting will be devoted to development of a strong statement of need. This must be submitted to the IEEE Standard Board before the project can proceed.

6.0 W.G. on Dry Type Through-Fault Duration Guide - Roy Uptegraff, Chairman

Roy Uptegraff reported on the results of the successful Transformer Committee ballot at the Subcommittee meeting.

6.1 Results of the ballot were:

Affirmative	79
Negative	3
Affirmative with comment	9

Two negative votes were resolved without change. The remaining negative vote was resolved with editorial changes. With these changes and other minor editorial changes, the document will be forwarded to the Standards Board.

7.0 New Business

Roy Uptegraff reported on a meeting of the IAS Industrial and Commercial Power Systems Dept. This group is preparing a "yellow book" - a safety book for industrial users. This book will contain safety rules and procedures for transformers. The need for liason with this group was discussed.

7.1 The Administrative Subcommittee would like Dry Type Current Limiting Reactors transferred to the Dry Type Subcommittee.

7.1 The Chairman has written to Dean Yannucci requesting clarification of this transfer. He also pointed out that there are scope changes required for the following subcommittees:

Dry Type	_____	- to include dry type
Dielectric Tests	}	reactors
Performance		- changed to include
Insulation Life		only liquid filled
		reactors
Standards	_____	- changed to delete
		reactors from its
		scope of respons-
		ibility

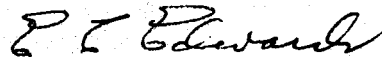
Further discussion on this proposal change will resume at the next Subcommittee meeting. Correspondence with Dean Yannucci is attached.

7.2 The Chairman requested comments on whether or not the Dry Type Subcommittee should assume responsibility for dry type grounding reactors, zig-zag grounding transformers and related equipment. A suggestion that a letter be sent to Subcommittee members was made.

Chairman will send out a letter.

7.3 The Chairman was requested by Dean Yannucci to determine if the Subcommittee had any interest in working on a "Recommended Practice for Design and Operation of Wind Farm Generating Stations". There was no interest indicated by the group.

Meeting Adjourned



E. C. Edwards, Secretary
Dry Type Transformer
Subcommittee

ECE/cak
0046/2E

APPENDIX "G"

REPORT OF THE INSTRUMENT TRANSFORMERS SUB-COMMITTEE TO THE TRANSFORMERS
COMMITTEE, 10/30/85

The Instrument Transformers Sub-Committee met in Toronto, Canada, Tuesday, October 29, 1985, with 7 members and 11 guests present.

Minutes of the April 16, 1985 meeting in St. Louis were approved.

Sub-Committee 7 of ANSI C-12 (Electricity Metering) is now balloting a draft for revision of C12.11-1978. This document covers additional requirements for instrument transformers for revenue metering. The current draft extends the coverage upward through 350kv BIL, and also eliminates the current duplication of material in C57.13. The Instrument Transformer Sub-Committee again expressed the intention of eventually publishing this material under a C57.13 designation.

The Switchgear and Transformer Working Group on Instrument Current Transformers for A.C. High Voltage Breakers, P670, met in Toronto on October 28, 1985. This reactivated Working Group had previously met in Columbus, Ohio, June 19, 1985. On October 28th, development of a new draft was completed, and the Working Group will receive a letter ballot on this material. The Working Group has agreed that the proposed document should be published under a C37 designation.

The results of the recent Sub-Committee letter ballot on C57 .13-198X, P546/D3, were reported as 12 approved (including 3 with comments), and 1 not approved. The Sub-Committee reviewed the entire draft, resolving all comments not previously resolved. The negative ballot, and one other item arising from the review were not resolved. The Chairman will research these two items, and will ballot the Sub-Committee on proposals for resolution. After resolution, a draft will be referred to the Transformer Committee for ballot.

Additional copies of Draft #4, Detection of Partial Discharges and Measurement of Apparent Charge in Instrument Transformers, will be forwarded to Sub-Committee members, in preparation for activity on this subject at the next meeting.

Ralph B. Stetson, Chairman
Instrument Transformers Sub-Committee

APPENDIX "H"

REPORT OF THE INSULATION LIFE SUBCOMMITTEE TO THE
TRANSFORMERS COMMITTEE, OCTOBER 30, 1985 AT
TORONTO, CANADA, DELTA CHELSEA INN

The Insulation Life Subcommittee met yesterday with a total attendance of 45, composed of 16 members and 29 guests. The first working group reporting was the Thermal Evaluation Working Group chaired by Al Wurdack. Al reported they had 5 members and 23 guests present at his meeting yesterday. ANSI C57.100, the revision of the Standard Test Procedure for Thermal Evaluation of Distribution Transformers has reached the last hurdle. The printer's galley proofs are expected before the end of the year. Al reported he is immersed in preparing a first draft of the proposed Test Procedure for Thermal Evaluation of Power Transformers. He is having some problems developing a good procedure for the design of test models. His intention is to follow the two EPRI project reports on this subject as a guide.

The remainder of their meeting was a report by Vincent Dahinden of Weidman of Switzerland, who described an extensive project of his company. The jointly sponsored project with the Swiss government is a study of ageing of various oil-immersed pressboards under electrical, mechanical, and thermal stress. The temperature ranged from 95 to 135 C and the test cells simulated common power transformer containment systems. Although the results reported are preliminary, they were very thought provoking and timely. Vince stated they expect to publish complete results in a forthcoming CIGRE paper.

Our next working group reporting was Thermal Tests, chaired by Bob Grubb. Bob reported they had 5 members and 7 guests in attendance. The only old business on the agenda was the status of P838/D9, the "Recommended Procedures for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Rating". Draft 9 incorporates the addition of Part C, which was approved at the St. Louis meeting. This was the resolution of the negative ballots received on Draft 8. Draft 9 will be mailed to the Subcommittee and Working Group for balloting next week. Don Fallon volunteered to help with the processing of this ballot.

Our third working group reporting was Guides for Loading which met yesterday in the Wren Room, no relation to Bill Wrenn their Chairman. We are sure Bill has never laid an egg, at least while he has been associated with this Committee. Bill reported 22 members and 21 guests present at their meeting.

Jacques Aubin reported that Draft 4 of the revision of IEC #354, Loading Guide for Oil-Filled Power and Distribution Transformer was distributed in May for comment. There have been a number of comments received. The Working Group hopes they can be resolved in time for the IEC's May 1986 meeting. The revision of C57.95, The Loading Guide for Regulators, is at IEEE for printing. It is scheduled for actual printing shortly after the first of the year.


The work on C57.99, The Guide for Current Limiting Reactors, is on hold. Herb Pflanz, task force chairman has resigned because the work would conflict with his consulting work. At the time of this working group's meeting, it was still a rumor that the Adcom Subcommittee would parcel out reactor projects to the appropriate functional subcommittees. The rumor proved true, so this working group will work only on the oil-filled current limiting reactors loading guide.

There being no further business, the Working Group adjourned and the Task Force for Revision of C57.91,92 and IEEE #756, The latter the Trial Use Loading Guide for Power Transformers Above 100 mVA, convened, chaired by Olin Compton. The philosophy of combining all three guides with the possibility of including oil-immersed current limiting reactors was discussed at length. Dave Douglas presented a motion to maintain separate documents for Power and Distribution Transformers. That is, maintain the present practice. A voice ballot was conducted with 4 in favor of separate guides and 37 in favor of a combined guide and 2 abstentions. The majority felt there was too much commonality to justify separation. Reports of efforts

of individual work teams were presented and discussed, including the need for designation of a "team leader" for each chore. It was decided that since standards specify -20C as the minimum operating temperature, the guide should extend loading recommendations to that temperature. Below -20C special considerations must be given to the transformer design and loading should then be addressed accordingly. Operation from a cold start below that level could involve oil viscosities that can limit effective cooling.

Olin Compton, who has done such a tremendous job in initiating this project, requested to be relieved as task force chairman because of a lack of time to properly address the project. It was suggested that since this is the principal task of this working group that the Task Force be dissolved and the Working Group and its Chairman take over this project. The Working Group reconvened and Bill Wrenn accepted the assignment.

It was suggested that since the subcommittee had finished all agenda business early, that Vince Dahinden be asked to repeat his report on Weidman's pressboard ageing project, since many in attendance were unable to attend the Thermal Evaluation Working Group Meeting. Vince, with the courage and stamina of a Swiss Mountain Climber reported his presentation for the second time that morning! An indication of the quality and content of his report was that almost all in attendance at his earlier presentation stayed throughout his encore. The subcommittee appreciates very much his cooperation and was an excellent example of this committee's opportunities for education. With that our meeting was adjourned.


C. J. McMillen
1/14/86

APPENDIX "I"

INSULATING FLUIDS

The Insulating Fluids Subcommittee met on Monday and Tuesday, October 28 and 29, 1985 with 26 members and 10 guests present.

1. The minutes of the April 1985 meeting in St. Louis were approved as presented.
2. Mr. Dave Sundin of RTE, Ed Norton, Consultant, Pierre Gibault of Syprotec and Charlie Hoesel of Arizona Public Service have been added to the list of members of the subcommittee. Mr. R.A. Burns of Englehard Minerals, Barry Cupples of Gulf and Vern Mulhall of Canadian General Electric have been removed from the membership.
3. The Chairman reported that the Guide for Reclamation of Transformer Oil has been proof-read and is presently in printing. It should be available very soon.
4. The Guide for Handling and Disposal of Transformer Grade Insulating Liquids containing PCB's, Project P799 is still with the IEEE Standards Board.
5. Question has been raised as to the present status of C57.106, Guide for Acceptance and Maintenance of Insulating Oil in Equipment. All members are requested to submit comments as to areas needing revised and a PAR will probably be requested for a project to revise or reaffirm.
6. Project C57.104, Gas Guide is presently under revision. Brian Hunter is preparing Scope, Introduction, Calibration and Use of Field Instruments and Use of Fixed Instruments for Gas Space Analysis. These should be ready for review prior to next meeting. The Sections on Sampling and the Bibliography should also be ready. The most difficult section, covering Interpretation is being prepared by a Working Group headed by Leo Savio which will have a draft prepared for presentation to the Subcommittee at the April meeting. The Subcommittee has elected to present a Symposium to the Main Transformers Committee membership on Tuesday afternoon of the October 1986 meeting in Pittsburgh. The Symposium was approved by the Administrative Subcommittee.
7. Project P954, Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid and Its Maintenance in Equipment was balloted by the Subcommittee as Draft 5. Five negatives and several comments were received. These were discussed extensively and the Working Group will now prepare Draft 6 for Subcommittee ballot prior to the next meeting.
8. Project C57.111, Guide for Silicone Fluid Draft 8 was presented by the Working Group Chairman, Tor Orbeck, and discussed. Draft 9 will be prepared for Subcommittee ballot prior to the April meeting.

9. There being no additional business, the Subcommittee adjourned until the Spring meeting in Little Rock, Ark.
10. The next meeting is April 6 - 19, 1986 at Excelsior Hotel in Little Rock, Arkansas.

Henry A. Pearce

Henry A. Pearce, Chairman
Insulating Fluids Committee

/slr

APPENDIX "J"

PERFORMANCE CHARACTERISTICS SUBCOMMITTEE
Toronto, Ontario, Canada - October 29, 1985
MEETING MINUTES

I. INTRODUCTION/ATTENDANCE

The Performance Characteristics Subcommittee (PCS) met at 2:00 p.m. on Tuesday, October 29, with 34 members and 31 guests registering their attendance.

II. APPROVAL OF MINUTES

The Minutes of the April 16, 1985, PCS Meeting were approved as submitted.

III. CHAIRMAN'S REMARKS

Dave Smith submitted a written liaison report (copy attached) concerning the development of a "Guide for the Protection of Network Transformers" by the Power Systems Relaying Committee.

Attendees were encouraged to attend the Transformer Loss Measurement Symposium scheduled later in the afternoon.

The Project Authorization Request (PAR) submitted 11/11/83 for the Failure Analysis Guide has still not received approval. Chairman Yannucci agreed to check on the status.

With regard to interpretation of C57.12.90, Section 5.3.2.3 dealing with voltmeter lead location, the Administrative Subcommittee directed the PCS to establish a small ad hoc task force to render an opinion. This was discussed further under New Business.

With regard to LTC Position Indication, the Administrative Subcommittee directed the PCS to establish an ad hoc task force to review a proposed revision to C57.12.10 and recommend further action if necessary. This was discussed further under Old Business.

The Surge Protective Devices Committee has offered an opportunity for participation in the development of design test standards for metal oxide dead front and under oil distribution arresters (see Appendix A, Enclosure V) C. McMillen volunteered to be the liaison for under oil arresters.

The Standards Coordinating Committee on Dispersed Storage and Generation (SCC23) is planning to develop a Recommended Practice for the Electrical Design and Operation of Wind Farm Generating Stations. Although no official liaison is planned, members interested in participating should contact W.G. Chairman D.C. Dawson, Southern California Edison Co., P.O. Box 800, Rosemead, CA 91770.

There will be a panel discussion at the Winter Power Meeting concerning Digital Wattmeters for Loss Measurements in Power Transformers.

The IEEE is in the process of procuring liability insurance for members involved in writing standards. To avoid confusion, the Secretary will provide the necessary membership lists; W.G. Chairman are not required to do so.

PES Organizational Manual update is due; W.G. and T.F. Chairman should forward updated rosters to the Chairman soon.

By direction of the Administrative Subcommittee, the W.G. on Revision of Test Code for Shunt Reactors (C57.21) will become an activity of the PSC. J. McGill is Chairman of this W.G..

PCS membership additions subsequent to the meeting were Lloyd Miller, Central-Moloney, Jack McGill, Siemens-Allis and George Bryant, Dow Chemical. This brings total PCS membership to 53.

VI. AGENDA

The agenda was accepted as proposed.

V. WORKING GROUP (W.G.) REPORTS

The W.G. reported as follows:

1. Transformers Directly Connected to Generators - B.K. Patel, Chairman

The W.G. met on Monday, October 28, 1985, with 8 members and 14 guests present. Draft 7 has not yet been issued; review and revision of Sections 6 and 7 have been assigned. The goal is to issue Draft 7 after the first of the year for W.G. review and comment. Liaison is being maintained with the Power Generation Committee.

2. Failure Analysis - D.J. Cash, Chairman

The Working Group on Transformer Failure Analysis met at 3:05 p.m. on Monday, October 28, 1985 with 23 members and 18 guests present. After introduction of members and guests, the minutes of the previous Working Group meeting in St. Louis, MO., were accepted without comment. It should be noted that the current membership roster stands at 37 members which is indicative of the interest in this activity.

Between the St. Louis meeting and this meeting, a Task Force meeting was held in Detroit, MI., on August 21 and 22, 1985, with 7 members present. Draft #1 was reviewed and revised according to the comments received at the Working Group meeting in St. Louis. Draft #1 was then sent to the Working Group for the first ballot. It was recognized that this draft still needed considerable work and that many valuable comments would be obtained by balloting.

The results of this first ballot are:

- ° 34 ballots sent out
- ° 18 ballots were returned
- ° 11 ballots were approved
- ° 7 ballots were not approved

The comments received with the ballots were distributed to the Working Group yesterday and the entire document was reviewed. The Task Force will meet again in January in Detroit to incorporate all comments into Draft #2. Following the January Task Force meeting, Draft #2 will be submitted to the Working Group for balloting. These results will then be discussed and received by the Working Group on April 7, 1986, at Little Rock, Ark.

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

The W.G. on Loss Tolerance and Measurement met at 10:05 on Monday, October 28 with 15 members and 36 guests present. The status was discussed of proposed changes to C57.12.90 "Corrections to Load Losses and Impedance Voltage Measurements" and "Voltmeter Connections for No-Load Loss Measurement". The status is:

There were two negative notes that could not be resolved in time to make the 1985 revision of C57.12.90.

However, the two negative votes were resolved later, and a draft (D8) (with editorial corrections) was issued in a circulation of change. There were no objectives to the changes. The next step is to get the documentation to Ray Smith.

The second subject was no-load loss temperature correction. The W.G. took a survey of temperature correction data to see if we can agree to a simplified correction method. The data was reviewed at the meeting. Every respondent reported temperature correction as a linear function of temperature. This means that the reported corrections could be expressed in terms of percent per °C. The overall average correction of 10 survey responses was 0.065% per °C.

It was felt that as long as correction would be made to a reference temperature near the test temperature, where the correction magnitude would be small to begin with, that we would agree to a simplified correction formula. The W.G. developed the following proposal:

1. A reference temperature for no-load losses of 20°C.
2. Temperature to be determined by measuring top oil temperature.
3. No-load losses to be corrected to 20°C using a correction of -.065 percent per °C.

The W.G. plans to incorporate this proposal in a ballot of the Performance Characteristic Subcommittee.

The third item was the loss measurement guide. On June 13 the IEEE Standards Board approved this project as P1098. A task force met Sunday afternoon to begin this work. The task force is reviewing C57.12.08 and C57.12.90 to determine what should be removed from the test code and what should be dealt with in the guide.

4. Harmonic Load Current Heating - W.J. McNutt, Chairman

The W.G. met on the morning of October 29, 1985, with 12 members and 19 guests present.

Bill McNutt reported that D7 of the Recommended Practice for Establishing Transformer Capability When Supplying Non-sinusoidal Load Currents had been sent out on ballot to the Transformers Committee on August 30. 108 ballots were distributed with 90 returned.

- 77 Affirmative
- 8 Affirmative with comments
- 1 Negative
- 4 No Vote (Lack of Expertise)

This is a valid ballot. It is hoped that the one negative vote can be resolved. The comment on the negative ballot, as well as comments on several affirmative ballots, involved the effect of high harmonics on the transformer capability equivalent. It was proposed that an editorial change in working be made to explain that because of skin effect in the winding conductors, losses at high harmonics do not increase by the square of frequency. The consequence is that the simple methods of calculation given in this document become progressively more conservative for harmonic distributions with higher harmonics. Assuming resolution of the negative vote, and acceptance by coordinating groups, the document will be submitted to the IEEE Standard Board.

George Bryant reported that his meeting of the T.F. on Power Semiconductor Rectifier Transformers met on October 28, with 4 members and 8 guests present. Draft 2 of his document, C57.18.10, was balloted in the W.G.. Only 9 of 22 ballots were returned: 3 Affirmative, 2 Affirmative with comments, 2 Negative, and 2 Not voting. The negative votes involved load losses and temperature tests. Progress was made in the meeting on satisfactory disposition of these problems and other contents of the proposed standard. Discussion of these matters was continued in the W.G. meeting. Plans now call for revision of Draft 2 and issuance of Draft 3, which will again be balloted in the W.G.

At the PCS meeting it was decided that the W.G. would cease meeting since its task is complete. Our thanks to Mr. McNutt for his leadership on this document. Mr. Bryant's T.F. will now assume W.G. status.

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

The Working Group meeting was held on Monday, October 28, 1985, at the Delta Chelsea Inn in Toronto, Canada. In attendance were 11 members and 24 guests, that's 50% of the present 22 membership of the W.G.. After introduction of members and guests, the minutes of the St. Louis, MO., April meeting were accepted without comment.

The chairman distributed the results of Draft #8 balloted in the main transformer committee. In the group of not approved ballots were 4 on a single issue and 1 regarding the definitions taken from C57.12.80. The Chairman explained how the definitions negative goes back to the first ballot in the main committee where as at that time 3 or 4 members of the main committee voted negative. At that time the definitions were those not taken from the IEEE document, and the consensus was - that where definitions were already in existence, those should be used. The other remaining negative ballots will be left for resolution at the IEEE Standards Board level. Therefore it is proposed that the document be submitted to the IEEE Standards Board for processing to be finally published as a Guide.

The W.G. will continue in effect with the Chairman bringing the W.G. up to date on future meetings as to the status of the document. It is hoped that the W.G. members interested in this subject now direct their efforts and attention to be W.G. on Failure Analysis. In 2, 3 or 4 years it is hoped that this document will be reviewed for revision.

For future meetings it is proposed that only a 15 minute time spot will be necessary. The meeting was held from 1:00 p.m. until 1:25 p.m., one of the shortest meetings since January of 1980 when the present W.G. Chairman assumed this W.G.

6. Qualification of Transformers for Class 1E Application in Nuclear Power Stations - L.B. Stensland, Chairman

The Working Group met on Monday, October 28, 1985, with 5 members and 1 guest present. Since the previous meeting, Draft 13.4 has been issued to the Working Group members. This Draft includes clarifications to resolve previous negative ballots from NPEC-SC-2 members. Some additional editorial comments were also made at the meeting.

Draft 14 will be sent out to SC-2 members for ballot prior to November 30, 1985.

VI. PROJECT REPORTS

1. Ratio Tolerance (P462D) - M. Mitelman

The Main Committee ballot of Draft 6 has received only one negative ballot; resolution will be attempted prior to forwarding the results to the Standards Board.

VII. OLD BUSINESS

1. LTC Position Indication

Results of the survey were distributed (copy attached). By direction of the Administrative Subcommittee, a proposed revision to ANSI C57.12.10 will be reviewed to see if it adequately addresses the issue. This will be accomplished by an ad hoc task force consisting of Gerald Evans (co-ordinator), Dave Douglas, John Matthews, L.S. McCormick and Dave Truax. They will report their recommendation(s) prior to the next meeting.

*Eng. recommends the
this be added to
the sample notes
of C57.12.10*

VIII. NEW BUSINESS

1. Interpretation of C57.12.90, Section 5.3.2.3

Results of an unsuccessful attempt to attain a consensus with regard to voltmeter lead location has been previously submitted to PCS members (App.A, Encl.IV) By direction of the Administrative Subcommittee, a small ad hoc task force coordinated by Bob Frazer will review the issue and render an interpretation.

2. Nameplate Information Change Request

A request has been made to distinguish between "directed" and "non-directed" flow forced-oil cooled units on the nameplate (copy attached). A volunteer is being sought to develop and manage this change.

3. Separable Connector Temperatures

Cal Kappeler pointed out an apparent inconsistency between the acceptable temperature ranges for transformers and separable connectors. He was asked to seek an interpretation from ANSI C119.

IX. NEXT MEETING

The next meeting will be held on Tuesday, April 8, 1986, in Little Rock. The meeting was adjourned at 3:10 p.m.

John D. Borst
Chairman



Westinghouse
Electric Corporation

777 Penn Center Boulevard
Pittsburgh Pennsylvania 15235

September 18, 1985

Mr. L. J. Savio
Consolidated Edison Company
4 Irving Place
New York, NY 10003

Mr. J. D. Borst
Westinghouse Electric Corporation
P.O. Box 883
Jefferson City, MO 65102

Gentlemen:

Enclosed is my liaison report on the activities of the "Network Transformer Protection Working Group" of the IEEE Power Systems Relaying Committee. If you have any questions or comments on this, please contact me.

Yours truly,

D. R. Smith
Advanced Systems Technology

Enc:

cc: Mr. Tom Wiedman

Liaison Report

Network Transformer Protection Working Group,
Transformer and Bus Protection Subcommittee,
IEEE Power Systems Relaying Committee

The Working Group met at the May 1985 meeting of the IEEE Power Systems Relaying Committee Meeting in Albuquerque with 8 members and 9 guests present. At that time, eight of the fourteen writing assignments on the "Guide for the Protection of Network Transformers" had been received by the working group chairman, Tom Wiedman. The discussion at the meeting centered on the contents of the Guide.

The first draft of the Guide was distributed in September to members of the working group and other interested parties. From my review of the draft, it appears it will be concerned primarily with the protection of the system and equipment in the system. The resulting document will not have effect on network transformer standards or specifications unless users were to specify that primary side overcurrent devices, such as current-limiting fuses and/or vacuum fault interrupters, were to be included as an integral part of the network unit. When these overcurrent devices have been applied in the past in 480-volt spot networks, they were external and separate from the network unit.

D. R. Smith

D. R. Smith
9/17/85

LTC POSITION INDICATION SURVEY COMMENTS

COMMENT 1

In our opinion, the footnote to Table 7 from ANSI C57.12.00-1980 is sufficient.

"The normal position shall be designated by the letter N for load-tap-changers. The raise range positions shall be designated by numerals in ascending order, corresponding to increasing output voltage, followed by the suffix R, such as 1R, 2R, etc. The lower range positions shall be designated by numerals in ascending order, corresponding to decreasing output voltage, followed by the suffix L, such as 1L, 2L, etc. (this applies to the relationship between two windings of a transformer only, such as the H and X windings)."

COMMENT 2

No one system will satisfy all conditions. There should be options with the user specifying the correct choice.

COMMENT 3

Relate tap indication to raise or lower of voltage in winding where such control is specified. This could be either primary or secondary.

COMMENT 4

Should be studied.

COMMENT 5

The "Raise/Lower" directions should be referenced to the regulated voltage, not the low or secondary voltage as suggested by Niagra Mohawk.

Standardization of LTC Position Indication

Conflicts - The conflicts which must be eliminated by standardization of LTC position indication are caused by:

1. Physical location of tapped winding within transformer, and
2. Transformer application.

PCS Survey Suggestions - The two suggested methods of standardization of LTC position indication are effective in elimination of the first conflict, but not the second conflict.

The second conflict arises when the transformer is applied as a step-up transformer instead of a step-down transformer. This conflict is compounded when the transformer is applied in bulk power transmission where power flows in either direction.

The first suggested method refers to secondary voltage, which is different depending on whether the transformer is applied as a step-up or step-down transformer.

The second suggested method is better because it refers to turns ratio which is the same whether the transformer is applied as a step-up or step-down transformer.

The second suggested method is still confusing because it uses reverse logic that increasing the tap position number will reduce the turns ratio. This results in increasing secondary voltage in step-down operation, and decreasing secondary voltage in step-up operation.

Additional Suggestion - Number the tap changer positions such that increasing the tap position number will reduce the turns ratio. Label the direction of changing taps according to the effect on secondary voltage for the particular transformer application, i.e. step-down, step-up, or both.

John C. Dutton Enterprises, Inc.
Consulting Engineering
120 Hycliff Road
Rome, GA 30161
404-232-7781

10/7/85

cc: K.R.Linsley
R.E.Uptegraff
J.Borst ←

Subject: Additional Proposed Revisions to
ANSI C57.12.10

C. H. Hansen
NEMA
2101 L St. NW
Washington, D. C. 20037

Dear Rod:

I am writing to supplement my 8/31/85 letter concerning the ballot of the Proposed Revision of C57.12.10, and to provide a larger (and correct) version of Fig. 7 for Andrea Johnson. Changes proposed are described below:

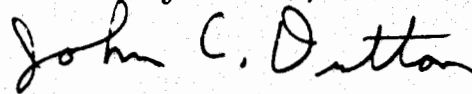
1. Para 1.2.1, First line--Insert "distribution," between "to" and "dry-type."
(Note--I regard this as an editorial change to correct an inadvertent omission. However, it should be brought to the attention of the C57.12.1 Sub-Committee.)
2. Two copies of Fig. 7 are included: (1) without markings, and (1) which is "marked-up." The marked-up copy is the correct version, and the unmarked copy may be useful as a beginning to prepare the final figure-work for the final printed version.
3. Page 35 needs some slight rearrangement to avoid possible confusion. The "note" above Fig. 7 should be placed under the circuit diagram, but above "Fig. 7 and associated text." See marked-up copy of P35 attached.
4. Additionally, Paragraphs 12.3 & 12.4 should be relocated to follow Fig. 7, as shown on the marked copy of P35.
- * → 5. At the April '85 meeting of the IEEE Performance Characteristics Subcommittee, some problems surfaced concerning the proper way to describe LTC "raise" and "lower" operations on the nameplates of LTC transformers. The Subcommittee has begun to study the matter.

Looking in ANSI/IEEE C57.12.80-1978, Para 7.2.4.2 states:
"7.2.4.2 REGULATED CIRCUIT--

The circuit on the output side of the regulator, and in which it is desired to control the voltage, or the phase relation, or both!"

This provides a suitable "base" to work from to solve this problem, and a separate attachment is provided entitled "Draft of Proposed Addition to the Revision of ANSI C57.12.10, D3 (4/85). This has been discussed with John Borst--Chmn P.C. S.C., and he plans to discuss it in the Subcommittee meeting late in Oct. 85, and provide us with any comments received. Obviously, it needs to be balloted in the ANSI C57.12.1 Subcommittee.

Sincerely Yours,



Member ASC C57.12.1
Chmn--IEEE Delegation to ASC C57

(NOTE: The following is proposed to replace present Paragraph 5.4)

5.4 NAMEPLATE. The nameplate shall conform to the requirements of ANSI/IEEE C57.12.00-198x, Section 5.12, Nameplate C, and as described in the following applicable paragraphs. It shall be located in Segment 1 near the centerline and near eye level.

5.4.1 For load-tap-changing transformers, the words "load-tap-changing transformer" shall be used instead of the word "transformer."

5.4.1.1 If appropriate, this description should be further modified to describe any specific application(s) involved-- such as: "step-up," "step-down," "phase-shifting," etc.

5.4.2 The nameplates of LTC transformers involved in controlling the voltage of a "regulated circuit" (as defined in ANSI/IEEE C57.12.80-1978, Para 7.2.4.2) shall include the data described below--depending on the application involved: i.e., "step-down," "step-up," "phase shifting"--or combinations of these.

5.4.2.1 "Step-down" transformers involved only in controlling the voltage of the "regulated circuit" (commonly the low-voltage winding) shall include the following information:

(1) A tabulation of the no-load voltages available

for various operating
positions of the LTC equipment, the position(s) of
any tap-changers for deenergized operation which may
be involved in achieving the tabulated

voltages, and a column indicating the effect

on the "regulated circuit" voltage of LTC operation \wedge involved: i.e., "raise" or "lower."

- (2) The labels of the LTC control pushbuttons involved in manual operation to change voltage shall be designated as "raise" or "lower."

Operating the "raise" pushbutton shall raise the voltage of the "regulated circuit." Similarly, the "lower" pushbutton shall lower the voltage of the "regulated circuit."

5.4.2.2 "Step-up" transformers involved only in controlling the voltage of a "regulated circuit" (commonly the high-voltage winding).

- (1) Nameplates should be similar to those described in 5.4.2.1 above except that the LTC "raise" and "lower" control pushbutton relationships will normally be reversed as compared to those involving a "step-down" transformer.

5.4.2.3 In cases where both "step-up" and "step-down" operation are involved, two nameplates shall be provided--one labeled "for step-down operation," and the other labeled "for step-up" operation.

5.4.2.4 Transformers involved in "phase-shifting" between the "input" and "output" terminals of the transformer (with or without accompanying control of voltage), or other special features, shall be designed with the mutual agreement of the user and the transformer manufacturer.

5.4.2.5 Each nameplate involved shall state (as appropriate) which winding (H,X,Y,etc.) is to be connected to the "regulated circuit" such as:

- (1) The "X" winding is intended to be connected to the "regulated circuit," or
- (2) The "H" winding is intended to be connected to the "regulated circuit", etc.

Note: In a normal two-winding transformer, only a single winding can be connected to a "regulated circuit" at any one time.
i.e. Voltage can be controlled in only one circuit at a time.



Nebraska Public Power District

GENERAL OFFICE
P.O. BOX 499, COLUMBUS, NEBRASKA 68601-0499
TELEPHONE (402) 564-8561

May 13, 1985

John Borst
Westinghouse Electric Corp.
500 Westinghouse Drive
Jefferson City, MO 65101

John -

At the meeting in St. Louis, I mentioned the desirability of having the transformer nameplate on forced-oil cooled units to indicate whether the oil flow is "directed" or "non-directed".

This letter is a formal request from the Working Group, Guides for Loading, of the Insulation Life Subcommittee for the Performance Characteristics Subcommittee to consider, and if approved, act on that suggestion.

A handwritten signature in cursive script that reads "Bill".

W. E. Wrenn
Chairman
WG Guides for Loading

WEW:meb

cc: Olin Compton

Table 7
Nameplate Information

NAMEPLATE A	NAMEPLATE B	NAMEPLATE C
Serial Number (1)*	Serial Number (1)	Serial Number (1)
Class (OA, OA/FA, etc) (2)	Class (OA, OA/FA, etc) (2)	Class (OA, OA/FA, FOA, etc) (2)
Number of phases	Number of phases	Number of phases
Frequency	Frequency	Frequency
kVA rating (1), (2)	kVA rating (1), (2)	kVA rating (or MVA) (1), (2)
Voltage ratings (1), (3)	Voltage ratings (1), (3)	Voltage ratings (1), (3)
Tap voltages (4)	Tap voltages (4)	Tap voltages (4)
Temperature rise, degrees C	Temperature rise, degrees C	Temperature rise, degrees C (2)
Polarity (single-phase transformers)	Polarity (single-phase transformers)	Polarity (single-phase transformers)
Phasor diagram (polyphase transformers)	Phasor diagram (polyphase transformers)	Phasor diagram (polyphase transformers)
Percent impedance (5)	Percent impedance (5)	Percent impedance (5)
Approximate total mass in pounds (Kg) (7)	Basic lightning impulse insulation levels (BIL) (6)	Basic lightning impulse insulation levels (BIL) (6)
Connection diagram (9)	Approximate masses in pounds (Kg) (8)	Approximate masses in pounds (Kg) (8)
Name of manufacturer	Connection diagram (9)	Connection diagram (9)
Installation and operating instructions reference	Name of manufacturer	Name of manufacturer
The word <i>transformer</i> or <i>autotransformer</i>	Installation and operating instructions reference	Installation and operating instructions reference
Type of insulating liquid (generic name preferred)	The word <i>transformer</i> or <i>autotransformer</i>	The word <i>transformer</i> or <i>autotransformer</i>
Conductor material (of each winding)	Type of insulating liquid (generic name preferred)	Step-up operation suitability (10)
	Conductor material (of each winding)	Tank, pressure, and liquid data (11)
		Type of insulating liquid (generic name preferred)
		Conductor material (of each winding)

* Numbers in parentheses refer to the Notes below and on Page 23.

NOTES: (1) The letters and numerals showing kVA, serial number, and voltage ratings shall have a minimum height of 0.156 in (3.97 mm) whether engraved or stamped. The height of other letters and numerals shall be optional with the manufacturer.

(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.

(3) The voltage ratings of a transformer or autotransformer shall be designated by the voltage rating of each winding separated by a dash (-), or voltages may be listed in tables. The winding voltage ratings shall be designated as specified in Fig 2.

If the transformer is suitable for Y connection the nameplate shall be so marked except that, on a two-winding single-phase transformer which is insulated for Y connection on both windings, the nameplate shall show the Y voltage on the high-voltage side only for such transformers having high-voltage ratings above 600 V.

(4) The tap voltages of a winding shall be designated by listing the winding voltage of each tap, separated by a slant (/), or shall be listed in tabular form, the rated voltage of each tap shall be shown in volts, except that for transformers 500 kVA and smaller with taps in uniform 2.5% or 5% steps, they may be shown as percentages of rated voltage.

The taps shall be identified on the transformer nameplate by means of letters in sequence, or arabic numerals. The numeral 1 or letter A shall be assigned to the voltage rating providing the maximum ratio of transformation with tap changers for deenergized operation.

NOTE: The *ratio of transformation* is defined as the *high-voltage volts* divided by *low voltage volts*.

The normal position shall be designated by the letter *N* for load-tap-changers. The raise range positions shall be designated by numerals in ascending order, corresponding to increasing output voltage, followed by the suffix *R*, such as 1*R*, 2*R*, etc. The lower range positions shall be designated by numerals in ascending order, corresponding to decreasing output voltage, followed by the suffix *L*, such as 1*L*, 2*L*, etc. (this applies to the relationship between two windings of a transformer only, such as the *H* and *X* windings).

This applies to two-winding transformers only.

The rated currents of all windings at the highest kVA rating and on all tap connections shall be shown for transformers 501 kVA and larger.

Any reduced capacity taps shall be identified.

(5) The percent impedance shall be given between each pair of windings, and shall be the tested value for transformers 501 kVA and larger. The voltage connection shall be stated following each percent impedance and, if the transformer has more than one kVA rating, the kVA base shall be given.

(6) Full wave BIL in kilovolts of line terminals shall be designated as in the following example:

HV Winding	450 BIL
HV Winding Neutral	110 BIL
HV Winding Neutral Bushing	95 BIL
LV Winding	95 BIL

(7) For transformers rated less than 37.5 kVA single-phase or less than 30 kVA polyphase, the mass may be omitted from the nameplate. Supplemental data shall be available showing volume of oil required and the approximate mass of the transformer for ratings smaller than those for which the data are shown on the nameplate.

IEEE TRANSFORMERS COMMITTEE

October 27-30, 1985 - Toronto, Ontario, Canada

Working Group - Revisions to Test Code for Shunt Reactors (C57.21)

This Working Group met at 10:00 a.m. on October 29, 1985, with ten attendees; six members and four guests. One of the guests, Mr. Richard Dudley of Trench Electric Company, became a member making the total membership fifteen.

After the usual introductions, the minutes of the last meeting in St. Louis were approved.

This meeting centered around the continuing comments, corrections and suggestions pertaining to the remaining portions of draft #1 for Revising the Test Code for Shunt Reactor Standard (C57.21). Highlights of these discussions are listed below.

1. The table listing routine, design and other tests was modified slightly. The paragraph under "Total Loss Measurements" was deleted as it was contradictory to the designated listing of being a routine test. Also, the mechanical tests were made routine, not design.
2. A question about the lower limit of 500 kVA for this standard was discussed. Apparently reactors below this value are not manufactured or required; therefore, the 500 kVA limit remains in the title.
3. There was considerable discussion on the 105% of rated voltage limit for testing the reactor during the temperature rise tests and the 60% of rated voltage allowed if the 105% voltage is not attainable due to power requirements. The discussion resulted in keeping the limits the same but adding the following paragraph:

"All reactors having a rated voltage of 34.5 kV or less shall be tested at full test voltage."

4. At the request of the Chairman, Mr. Richard Dudley gave a short presentation on testing dry type shunt reactors for possible addition to this standard. It was agreed that the information on dry type reactors, if not already in the standard, should be added as an appendix or within the body of the standard.
5. Under the section entitled "Temperature Rise Tests," it was agreed that the following sentence should be added:

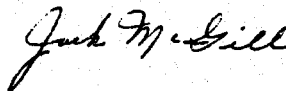
"It should be noted that single phase testing at full current is more meaningful than reduced voltage three phase testing."

IEEE Transformers Committee
October 27-30, 1985

November 4, 1985
Page Two

The one major area for discussion at the next meeting will be testing reactors, single phase or three phase, for losses, sound level, and vibration tests. Draft #2 will be prepared and distributed to all members prior to the next meeting in Little Rock, Arkansas.

Hopefully this revised standard should be ready for balloting to the members of the Working Group by the fall 1986 meeting.



Jack W. McGill
Chairman

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STATUS OF EPRI TRANSFORMER PROJECTS

Transformer Overload Characteristics, (RP1289-3,-4)

The objectives of this project are to determine the operating conditions under which bubbling occurs in full-size transformers and to demonstrate whether or not bubbling conditions can cause transformer failure. It is expected that this knowledge will help utilities make risk assessments in relation to their emergency loading practices.

Testing of the two 20 MVA transformers at Muncie is underway. The age cycling tests are complete and they are being prepared for the special step loading cycles. These tests will be followed by corona tests and impulse tests. A purchase order has been issued to GE Rome for shipments of the two special EPRI isolation transformers required by Muncie in order to run the impulse tests.

To date, all of the turn-turn models have been tested. Work on the section-section models and the thermal models has started. In parallel with this, GE is exploring modeling of the "bubble inception" to permit prediction of safe load limit for transformers.

HVDC Converter Transformers (RP1424)

Transformers applied in converter stations are subjected to both ac and dc voltages but they do not distribute themselves in the same way. Ac voltages distribute inversely proportionally to their dielectric constants, whereas dc voltages distribute directly proportionally to their resistivities. The dc resistivity of insulation material is in most cases affected by the temperature, electrical stress, and length of time the material is exposed to the dc stress.

In cooperative efforts, EHV Wiedmann, Inc., in Vermont and General Electric are working to improve the dielectric system for converter transformers.

The concept under study is to use solid insulation with different bulk resistivities to tailor the field distribution and reduce the maximum stress. A model system has been picked and flux plots made with several combinations of insulation material used. Short term and longer term tests are under way to prove the performance of these models. Should this be accomplished, it would have a significant effect on the economics of insulation design, including additional savings in the size and weight of a dc converter transformer.

Power Transformer with Two-Phase Cooling (RP1499-2)

The objective of this project is to advance the state of the art of two-phase cooling of power transformers into medium power sizes. The primary objective is to achieve a cost equal to or lower than equivalent oil units. Secondary objectives are low flammability, explosion-resistance, light weight and lower dependency on oil.

A 65-MVA transformer has just been energized at Con Edison. Luxtron hot spot detectors were installed to monitor performance.

Static Electrification Control in Power Transformers, (RP1499-7)

A study of the effect of different types of sample bottles on the charging tendency of oils is in progress. Impulse test measurements are being made on 17 supplier oils. Some analytical work to identify charge producing agents is also in progress.

Stacked Amorphous Metal Power Transformer, (RP2236-1, -2)

The amorphous alloys which Allied began developing over a decade ago offer the possibility of greatly reducing core losses in all transformers. Application of the new material to power transformers is more of a challenge because the cutting and stacking process requires new techniques. Westinghouse is working with us to eliminate 60% or more of the core losses and to demonstrate a commercially viable manufacturing process.

A 500-kVA transformer will be shipped to Niagara Mohawk for field demonstration. This unit experienced a turn-to-turn failure not associated with the core during factory tests. It was subsequently repaired and has passed all factory tests. No short circuit tests have been made but we suspect the unit does not have full rating in this area. Field demonstration will proceed since (a) newer cores are stronger, and (b) the major thrust of the field unit is to check for any shift in the magnetic properties of the core.

Allied has produced ribbon with good magnetic properties with a thickness of 8 mils, but other characteristics such as brittleness have made this material unacceptable for the core assembly process. One-mil ribbon has acceptable properties but requires many more layers than conventional steel for the same build. Powercore™, which consolidates six to ten ribbons by thermal compression bonding, is a material aimed at solving this obstacle. Effort is presently directed toward increasing the throughput of the Powercore™ rolling mill and at improving the quality of the edges.

Development work is proceeding at Westinghouse on the processing and application of Powercore™ amorphous metal in "brick" type corelet construction.

The construction of the first three of four 2500 kVA corelets for comparative performance is underway using the "brick" type of construction. The first two are being evaluated to see what designs and construction techniques give the lowest losses.

A development shear is available to perform amorphous cutting and hole punching. This information will be used to establish a specification for a pilot facility projected for construction in 1986.

Low Cost, Gas-in-Oil Detector, (RP2445)

When abnormalities occur inside transformers, gases can be generated in the insulating oil. For example, if arcing occurs, hydrogen tends to be generated, and if the cellulose insulation overheats, carbon monoxide is usually given off.

The object of this project with Westinghouse Electric Corp. is to develop a low-cost detector that can distinguish between carbon monoxide and hydrogen, giving an early warning of internal transformer distress. The design that has evolved uses a permeation cell (developed under RP748) that allows gases to diffuse from the oil through a diaphragm and into a collection cavity.

The gases are then periodically exhausted past metal oxide sensors to the atmosphere. During this process, oxygen is depleted from the metal oxide sensors, varying their resistivity. The resistivity change varies depending on the type of gas to which the sensor is exposed. The sensitivity of the detector has been arranged to indicate 100-500 ppm of hydrogen or 500-3000 ppm of carbon monoxide.

Two prototypes were constructed and tested under laboratory conditions. Next, ten units will be produced for field evaluation. Of particular concern will be the effects of extremes in temperature or humidity, and the ability of the system to maintain its reliability by self-checking any malfunctions. Host utilities for field evaluation are being sought.

Advanced Power Transformer, (RP2618)

The increased cost of fuel and the inflationary pressures on the economy over the past 10 to 15 years have put equal emphasis on conservation of energy and capital. Although the transformer by itself is a very efficient piece of equipment, electric power flows through several transformers on its way from generators to consumers. Hence, even the small energy loss in each transformer is multiplied by three or four, making the total loss much more significant. For this reason, a primary goal of EPRI's R&D program is to develop more efficient power transformers. Whereas core (no-load) losses are attacked through the amorphous core steel development effort (RP1290 and 2236), the load losses are addressed in this new project (RP2618), under contract to Westinghouse with Phelps-Dodge as a subcontractor.

The load losses are primarily dissipated in the windings, and are related to the resistance of the conductors. Hence, by using larger conductors the losses can be reduced. However, with alternating currents, there are magnetic field effects that tend to push the currents towards the surface of the conductors (skin effect) thus reducing the effective area used for current conduction. Hence, just increasing the conductor area is not an economical approach. Furthermore, there are eddy currents induced into the conductors by the magnetic fringing fields of the windings. Because these currents are more significant in thick conductors, transformer manufacturers use multi-strand conductors that are transposed in the cable for the windings. By dividing the conductor into many small branches, the skin effect is reduced as are the eddy losses of the conductors.

About five years ago Phelps-Dodge invented a new conductor, which is referred to as a transposed ribbon cable. It is a flat cable made up from many transposed strands. The cable promises much lower losses and permits the construction of compact windings. Hence, the new cable may help to reduce the load losses by reducing skin effect and eddy current losses; and, because the winding should be smaller, it should reduce the winding resistance as well. Smaller transformers will allow the manufacturers to ship higher capacity transformers if needed, but this is a fringe benefit and not a goal in itself. This project should demonstrate the feasibility of producing windings that satisfy the transformer manufacturers' requirements, as well as demonstrate that it is feasible to build windings using the new conductors. This phase of the project should be completed in 1985.

1. The US has balloted recent IEC proposals as follows:
 - a. IEC 14(Secretariat)115, Proposed "Loading Guide for Oil-Immersed Power Transformers"
NEGATIVE, with comments.
 - b. IEC 14(Central Office)59 and 14(Central Office)59A
"External Clearance in Air for Power Transformers"
AFFIRMATIVE.
 - c. IEC 14(Central Office)61
"Proposal for an Amendment to Publication 726:
Dry-Type Power Transformers"
AFFIRMATIVE.
 - d. IEC 14(Secretariat)152, Proposed
"Loading Guide for Dry-Type Power Transformers"
NEGATIVE, with comments.
 - e. IEC 14(Central Office)58
Draft Standard "Determination of Transformer and
Reactor Sound Levels"
AFFIRMATIVE, with comments.
2. IEC Meeting Participation
 - a. Mr. C. J. McMillen, Member of the IEC TC14 Subcommittee preparing a Proposed Revision to the IEC "Loading Guide for Oil-Immersed Power Transformers" (Pub 354) attended a meeting on this subject Oct. 3-5, 1984 in Vienna, Austria.
 - b. Mr. G. A. Leiter, Member of the IEC TC 14B Working Group 2 (LTC Transformers) attended a meeting on the Proposed Revisions of IEC Publications 214 & 542 in Wiesbaden, Germany in Sept. 26-27, 1985.
3. Proposed IEC 14(Secretariat)156 "Report From WG 19, Amendments to Publication 76" is now being distributed to members of the US Technical Advisory Group for comment.

John C. Dutton

John C. Dutton
US Tech Adv to IEC TC 14 & 14B

APPENDIX 1

The whole list of existing publications and pending revisions prepared by TC 14 (with SC 14B and SC 14C, but not 14D) is as follows :

Publication	76 - 1	(1976)	General
	76 - 2	(1976)	Temperature Rise
	76 - 3	(1980)	Insulation
	- " - Amendment 1	(1981)	- " - (Miscellaneous details)
	- " - Amendment 2	(?)(pending)	External Clearances
	76 - 4	(1976)	Tappings
	76 - 5	(1976)	Short circuit
	- " - Amendment 1	(1979)	- " - (Miscellaneous details)
	214	(1976)	Tapchangers, <u>revision pending</u>
	289	(1968)	Reactors, <u>revision pending</u>
	354	(1972)	Loading Guide for oil-immersed transformers, <u>revision pending</u>
	542	(1976)	Tapchanger Application Guide, <u>revision pending</u>
	551	(1976)	Noise Measurement, <u>revision pending</u>
	606	(1978)	Transformer Application Guide
	722	(1982)	Impulse Testing Guide
	726	(1982)	Dry Type Transformers
	XXX	(pending)	Loading Guide for dry-type transformers

Several other Publications, prepared by other Committees are cross-referenced in the above documents, eg., 60 (High Voltage Testing), 71 (Insulation Co-ordination), 85 (Thermal Classification), 137 (Bushings).

APPENDIX 2

The official documents from National Committees which have been considered by the WG are :

14(UK) 53	(1979)
14(NL) 56	(1980)
14(D) 56	(1980)
14(CA) 7	(1983)
14C(Tokyo/France) 5	

Several of these documents are old and their content has, to a great extent, been taken care of by other action in the meantime, such as the work on a revised Loading Guide (Publication 354), the 1979 Amendment 1 of Publication 76-5, the revision of Publication 551 (1985). Certain discussions under the auspices of CIGRE have also touched some of the suggestions. The WG has examined the material. Some of the remaining matters have been carried on in the present document - other have not gained support.

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APPENDIX "N"

LIAISON REPORT


ANSI C57.12.2
Subcommittee On Distribution Transformers

The Subcommittee met on October 17-18th in Asheville, North Carolina. The C57/37 standard dealing with Cabinet Security has been approved by the subcommittee, and forwarded for approval to the Main Committee. This action then allows C57.12.21, C57.12.22, and C57.12.25 to also be forwarded, as they reference the new as yet un-numbered standard.

The standard on Underground Distribution Transformers, C57.12.23 is in the proofstage, and should be published in 1986.

Standard C57.12.20 on Overhead Transformers has been balloted by the Main Committee, and a few errors, contradictions, and editorial changes will be resolved by the working group.

The Subcommittee also requests that the IEEE Transformer Committee resolve the apparent conflict between ANSI/IEEE Standard 386, Paragraph 4.1 (4), and C57.12.00, Paragraph 4.1.2.2, again with regard to Environmental Temperatures. The low temperature is still a concern, but more so in the upper limit of 65 C for load-break connectors. It was pointed out that this would preclude operation of the connector at full load. As this item is a transformer component, it seems reasonable that the Transformer Committee should clarify.


Calvin P. Kappeler
October 25, 1985

CPK;vls

Liaison Report

ANSI C62 and IEEE SPDC Meetings
by
Edward J. Yasuda

The following are brief activity summaries of the ASC C62 and the IEEE Surge Protective Devices Committee Meetings held subsequent to the Transformers Committee in St. Louis.

ASC C62 (September 4, 1985)

ASC C62 successfully balloted a resolution to process future IEEE Standards # 143 (Neutral Grounding Application Guides) and # 32 (Neutral Grounding Devices) through ASC C62. These standards will become ANSI Standards in the future.

IEC proposed standard for Metal Oxide Surge Arresters is expected to be balloted by TC 37 in early 1986. This is the corresponding standard to the ANSI C62.11 recently balloted by the IEEE Surge Protective Devices Committee.

Surge Protective Devices Committee Meetings (May 10, 1985 and September 17, 1985)

The draft standard ANSI C62.11 - Metal Oxide Surge Arresters - was balloted within the SPDC Committee. All negative ballots were resolved; however, coordination within and outside of PES is in progress. Plans are to submit final draft to IEEE Standards Boards prior to December 1, 1985.

Part I of IEEE Standard # 143 on Neutral Grounding Application Guide was successfully balloted in SPDC. The Part I draft will now be transmitted to IEEE Standards Board.

A SPAR is being drafted to revise IEEE Standard # 32 on Neutral Ground Devices. Close coordination with the Transformer Committee will be required.

The SPDC instituted an award to individual members for outstanding contribution to SPDC Standards development activities. The award is a "Standards Medallion Award" and presented to the individual by a representative of the IEEE Standards Board.

For the Fall 1986 meeting in Seattle, WA, the SPDC decided to have a special activity on an HVDC Arrester Design, Application and Testing. Panel members will be from both the manufacturers and users.

APPENDIX "P"

ANSI C89 REPORT

10/30/85

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

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

o A NEMA section Letter ballot is in process. Revisions include removal of high voltage (>1.2kv) references, but retain sound level limits for above 1.2kv Class. These are applicable to Commercial, Institutional, and Industrial Transformers.

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

o A ballot for re-affirmation is in process.

S. J. Antalis

Liaison Representative