

*IEEE*

*TRANSFORMERS COMMITTEE*

**MEETING MINUTES**

***MARCH 28, 1990***

***DENVER, COLORADO***

ATTENDANCE LISTING - DENVER MEETING - MARCH 1990

GUESTS PRESENT:

J. ANTWEILER	J. PATTON
T.L. BOWERS	D.E. PARR
M. CAMBRE	G. PAYERLE
W.J. CARTER	P.A. PAYNE
R. CHATTERJI	V.Q. PHAM
B. CLARK	D.W. PLATTS
J.C. CROUSE	R.L. PROVOST
V. DAHINDEN	G.J. REITTER
F. DAVID	W. REVELL
P. DEWEVER	A. RIZVI
F. ELLIOTT	F. ROCHON
J. ARLINGSSON	J. ROSSETTI
J. FOLDI	G.W. ROWE
H.G. FISCHER	M.P. SAMPAT
G.E. FORREST	V.S. SANKAR
R. FOX	W. SCHWARTZ
W. FRANCKEK	D.M. SHAH
J. GARZA	P. SINGH
J.P. GIBEAULT	S.D. SMITH
R. GOETHALS	G. SPARAGOWSKI
R.L. GRUNERT	M. SPRINGROSE
G.E. HENRY III	R. STONER
P.J. HOPKINSON	R. SUBRAMANIAN
B. HUNTER	C.F. TODD
G. KRAUSE	H.J. WINDISCH
F.A. LEWIS	J.G. WOOD
D.L. LOWE	F.N. YOUNG
S.P. MOORE	
C.L. MOORE	
L. NICHOLAS	
S.K. OKLU	

IEEE PES TRANSFORMERS COMMITTEE  
MEETING MINUTES  
DENVER, COLORADO - MARCH 28, 1990

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Chairman Robert Veitch opened the meeting at 8:00 a.m. by welcoming attendees to the session. This was followed by self introductions by all attendees.

Chairman's Remarks and Announcements - Robert Veitch

The Chairman thanked Denver hosts Felix and Marge Cook for the excellent meeting arrangements. 202 members and guests were registered along with 52 spouses.

Chairman Veitch acknowledged luncheon speaker Ronald J. Binz, Director of the Colorado Office of Consumer Counsel. His remarks offered consumer advocacy perspectives on issues facing the electric utility industry.

Approval of Minutes of November 1, 1989 - Robert Veitch

The minutes were approved as submitted.

Reports of Subcommittees

Administrative - Robert Veitch

The Administrative Subcommittee minutes are attached (TC-B). A listing of the future meetings and membership are summarized in Attachment TC-B. Chairman Veitch reviewed the requirements for Transformer Committee membership.

Vice-Chairman John Bergeron has resigned from committee involvement due to a change in job responsibilities. As a result, the officers for 1990-91 will be Robert Veitch (Chairman), John Borst (Vice-Chairman) and Jim Harlow (Secretary). Chairman Veitch has agreed to extend his term for a third year (1991) to assure officer continuity.

A new Standards Subcommittee Chairman to replace Jim Harlow is being sought. Subsequent to the meeting, Wally Binder accepted this responsibility.

Awards Subcommittee Chairman Dean Yannucci has resigned from committee activities; Joe Bonucchi has agreed to fill this position.

Chairman Veitch reviewed highlights of his report (Attachment ASC-C).

A revised Transformers Committee Operating Manual has been compiled under the leadership of Leo Savio and should be published prior to the Fall Meeting.

PES has developed a policy statement on commercial activities scheduled in conjunction with technical committee meetings.

1990 PES goals were reviewed.

The Committee unanimously acclaimed its genuine appreciation to John Bergeron for his dedication and contributions to the Transformers Committee.

It was noted that Peter Bellaschi turned 86 in February.

Audible Sound and Vibration - Allen Teplitzky

Mr. Teplitzky's report is Attachment TC-C.

Mr. Teplitzky requested Committee interest in development of a noise siting guide (PC57.112 - Guide for Control of Transformer Sound); considerable interest was expressed from the floor. Liaison with the Substations Committee will likely be required.

In response to a question, Allen described highlights of the upcoming ballot on sound power measurements to be incorporated into the Test Code (C57.12.90). Sound intensity measurements are not included in this version but will likely be given future consideration.

Bushings - Loren Wagenaar

Mr. Wagenaar's report is Attachment TC-D.

Bushing rating when immersed in elevated oil temperatures (at normal loading) was discussed.

HVDC Converter Transformers and Smoothing Reactors - Bill Kennedy

Mr. Kennedy's report is Attachment TC-E.

Dielectric Tests - Bob Lee

Mr. Lee's report is Attachment TC-F.

Dry-Type Transformers - Roy Uptegraff

Mr. Uptegraff's report is Attachment TC-G.

Instrument Transformers - John Davis

Mr. Davis' report is Attachment TC-H.

Insulating Fluids - Henry Pearce

Mr. Pearce's report is Attachment TC-I.

Insulation Life - Dave Douglas

Mr. Douglas' report is Attachment TC-J.

IEEE 745 (Trial Use Guide for Loading Mineral Oil - Immersed Power Transformers Rated in Excess of 100 MVA) was brought before the Committee for consideration to upgrade its status from "Trial Use" to a full guide status. A motion to this effect was unanimously approved by a hand vote (63 affirmative) of Committee members.

Performance Characteristics - John Matthews

Mr. Matthew's report is Attachment TC-K.

Recognition and Awards - Robert Veitch for Dean Yannucci.

Mr. Yannucci's report is Attachment ASC-I.

Note that the Transformers Committee submission ("A Refined Mathematical Model for Prediction of Bubble Evolution in Transformers" by Fessler, Rouse, McNutt and Compton) was selected as co-winner of the 1989 PES Prize Paper Award.

Mr. Veitch noted the two committee members (Dr. Eddy So and Dean Yannucci) had achieved Fellow status.

Committee appreciation was expressed to retiring/resigning Working Group Chairmen Bill Wrenn, Don Cash and Len Stensland.

Transformer Standards - Jim Harlow

Mr. Harlow's report is Attachment ASC-B. Highlights noted include:

- . The need to expedite projects related to C57.12.00 and C57.12.90 to meet the 1992 revision date.
- . The availability of a new guide/form for Project Authorization Requests (PAR); note that copywrited material can only be used with permission.
- . The availability of a ballot service through the IEEE Standards Department (Attachment TC-N).
- . The publication of a 1990 version of the C57 collection.

The need was identified to clarify NEMA's intent for information contained in TR-1; appropriate alternate locations for sound level limits should be found.

West Coast - Dennis Gerlach

Mr. Gerlach's report is Attachment TC-L.

Reports of Liaison Representatives

EPRI - Stan Lindgren

Mr. Lindgren's report is Attachment TC-M.

Technical Papers - Robert Veitch for John Bergeron

Mr. Bergeron's report is Attachment ASC-H.

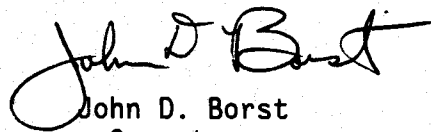
It was noted that papers are presently and will continue to be evaluated based on their merits, not based on IEEE quotas.

New Business

Comments by members indicated minimal damage to transformers as a result of the northern California earthquake.

There being no further new business, the meeting was adjourned at 11:34 a.m.

Respectfully Submitted

A handwritten signature in black ink, appearing to read "John D. Borst". The signature is written in a cursive style with a large, looping initial "J".

John D. Borst  
Secretary

ATTACHMENTS LIST

DENVER MEETING

TC-A AGENDA  
TC-B ADMINISTRATIVE SUBCOMMITTEE MINUTES - BORST

ASC-A ADMINISTRATIVE SUBCOMMITTEE AGENDA  
-B STANDARDS SUBCOMMITTEE REPORT - HARLOW  
-C COMMITTEE CHAIRMAN'S REPORT - VEITCH  
-D DIELECTRIC TESTS SUBCOMMITTEE REPORT - PEARCE  
-E INSTRUMENT TRANSFORMERS SUBCOMMITTEE REPORT - DAVIS  
-F INSULATING FLUIDS - PEARCE  
-G BUSHINGS SUBCOMMITTEE REPORT - WAGENAAR  
-H TECHNICAL PAPERS REPORT - BERGERON  
-I AWARDS SUBCOMMITTEE REPORT - YANNUCCI

TC-C AUDIBLE SOUND & VIBRATION SUBCOMMITTEE MINUTES - TEPLITZKY  
TC-D BUSHING SUBCOMMITTEE MINUTES - WAGENAAR  
TC-E HVDC CONVERTER TRANSFORMERS AND SMOOTHING REACTORS  
SUBCOMMITTEE MINUTES - KENNEDY  
TC-F DIELECTRIC TESTS SUBCOMMITTEE MINUTES - LEE  
TC-G DRY-TYPE TRANSFORMERS SUBCOMMITTEE MINUTES - UPTGRAFF  
TC-H INSTRUMENT TRANSFORMERS SUBCOMMITTEE MINUTES - DAVIS  
TC-I INSULATING FLUIDS SUBCOMMITTEE MINUTES - PEARCE  
TC-J INSULATION LIFE SUBCOMMITTEE MINUTES - DOUGLAS  
TC-K PERFORMANCE CHARACTERISTICS SUBCOMMITTEE MINUTES - MATTHEWS  
TC-L WEST COAST SUBCOMMITTEE MINUTES - GERLACH  
TC-M EPRI LIAISON REPORT - LINDGREN  
TC-N IEEE STANDARDS DEPARTMENT BALLOTING SERVICE - VOGEL

TC-A  
1 OF 1

IEEE/PES Transformers Committee Meeting

Wednesday, March 28, 1990

Chairman: R. A. Veitch

Vice Chairman: J. J. Bergeron

Secretary: J. D. Borst

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1. Chairman's Remarks and Announcements R. A. Veitch
  2. Approval of Minutes of November 1, 1989 R. A. Veitch
  3. Report of Subcommittees:
    - 3.0 Administrative R. A. Veitch
    - 3.1 Audible Sound and Vibration A. M. Teplitzky
    - 3.2 Bushing L. B. Wagenaar
    - 3.3 HVDC Converter Transformers and Reactors W. N. Kennedy
    - 3.4 Dielectric Tests R. E. Lee
    - 3.5 Dry-Type Transformers R. E. Uptegraff
    - 3.6 Instrument Transformers J. N. Davis
    - 3.7 Insulating Fluids H. A. Pearce
    - 3.8 Insulation Life D. H. Douglas
    - 3.9 Performance Characteristics J. W. Matthews
    - 3.10 Recognition and Awards D. A. Yannucci
    - 3.11 Transformer Standards J. H. Harlow
    - 3.12 West Coast D. W. Gerlach
  4. Reports of Liaison Representatives:
    - 4.1 EPRI S. R. Lindgren
    - 4.2 Discussion of Other Liaison Reports
  5. Technical Papers for Future IEEE/PES Meetings J. J. Bergeron
  6. New Business

RAVIEEE2



IEEE TRANSFORMERS COMMITTEE  
ADMINISTRATIVE SUBCOMMITTEE  
MARCH 26, 1990  
DENVER, COLORADO

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1. INTRODUCTIONS

Chairman Robert Veitch opened the meeting at 6:40 p.m. with 15 members and 5 guests present.

Members: John Borst            Dennis Gerlach            Leo Savio  
          Olin Compton        Bill Kennedy            Alan Teplitzky  
          John Davis            Bob Lee                Roy Uptegraff  
          Dave Douglas        John Matthews        Loren Wagenaar  
          Jim Harlow            Henry Pearce           Robert Veitch

Guests: S.M. Aslam Rizvi            Felix Cook  
          Georges Vaillancourt        Bipin Patel  
          Sue Vogel

2. MINUTES

The minutes of the Charlotte Administrative Subcommittee meeting were approved as submitted.

3. AGENDA

The proposed agenda (Attachment ASC-A) was approved as submitted.

4. MEETING ARRANGEMENTS

As of Monday night, 202 people (plus 52 spouses) were registered for the Denver meeting; 140 of these had pre-registered. The Tuesday luncheon has 110 reservations. The Subcommittee expressed its appreciation to host Felix Cook and his team for the excellent meeting arrangements.

Montreal host Georges Vaillancourt reviewed the planned arrangements for the October meeting.

Future Meetings Summary:

10/21-24/90	Montreal (Bonaventure)	G. Vaillancourt
5/12-15/91	Phoenix (Tempe Mission Palms)	D. Gerlach
11/3-6/91	Baltimore (Omni Inner Harbor)	J. Pollitt/J. Matthews
Spring '92	Birmingham	B. Patel/Aslam Rizvi
Fall '92	Cleveland	D. Douglas
Spring '93	Western Location	D. Gerlach
Fall '93	St. Petersburg Area	J. Harlow

TC-B  
2 of 5

5. IEEE/ANSI STANDARDS (Sue Vogel - IEEE)

a. IEEE Standards Department Activities

A 1990 version of the C57 standards collection is now available (call 1-800-678-IEEE to order).

The Standards Department will now conduct ballots on request for PES Technical Committees. Ms. Vogel will provide detailed information on utilization of this process. Editorial assistance is also available as a project/document nears completion prior to submittal to the Standards Board. IEEE's objective is to reach publication within 3 to 6 months after submittal.

IEEE is in the process of establishing a meetings coordinator to attempt to leverage IEEE's meeting volume; no detail is yet available.

b. ANSI C57 Committee

The co-secretariats are IEEE (Executive) and NEMA (Administrative). Although relations between IEEE and NEMA staffs are improving, major concerns remain on the operations of C57 and its subcommittees. Leo Savio will seek options to improve the effectiveness of the process. Note that C57 does intend to meet on 10/24/90 in Montreal.

c. A new guide/form for Project Authorization Requests (PAR) is now available.

6. TRANSFORMERS COMMITTEE OPERATING MANUAL - Leo Savio

The revised draft of the operating manual had been previously distributed; major changes include updates of standards procedures and addition of the Awards Subcommittee.

Numerous substantive and editorial comments were provided and discussed; clarification of Emeritus membership status needs to be added. Further comments should be sent to Leo by 4/15/90 so that another draft can be prepared.

7. STANDARDS ACTIVITIES - Jim Harlow

Jim reviewed the highlights of his informative Status Report (Attachment ASC-B); Subcommittee Chairmen are requested to review the project status section for accuracy. Jim Emphasized the importance of completing C57.12.00 and C57.12.90 projects by Spring 1992 for inclusion in the next revision.

# TC - B

## 3 OF 5

Georges Vaillancourt reported on the Transformers Committee ballot to remove the "Trial Use" status from C57.113 (Trial Use Guide for Partial Discharge Measurements in Liquid - Filled Power Transformers and Shunt Reactors). As a result of substantive feedback, revisions are deemed necessary. Jim Harlow will request that Rev Com allow a 2-year extension to the trial use status.

### 8. TECHNICAL COUNCIL ACTIVITIES AND CHAIRMAN'S REPORT

Chairman Robert Veitch submitted his report (Attachment ASC-C) and reviewed highlights which included a PES policy statement on commercial activities scheduled in conjunction with technical committee meetings.

### 9. TECHNICAL SUBCOMMITTEE ACTIVITY

#### a. HVDC Converter Transformers and Smoothing Reactors

Chairman Bill Kennedy indicated that their efforts will be divided into two standards: one for converter transformers and another for both oil-immersed and dry-type smoothing reactors. A new/revised PAR may be required.

#### b. Dielectric Tests

Chairman Bob Lee submitted a summary of activities (Attachment ASC-D). His subcommittee is planning a combination position paper/panel session on low side surges for the 1991 T&D Conference. Bob will contact the Technical Program Chairman (P. Sarma Maruvada) concerning this intention.

#### c. Performance Characteristics

Chairman John Matthews announced Don Cash's resignation from the Committee; Wally Binder will take his place as Chairman of the Failure Analysis Guide Working Group.

#### d. West Coast

Chairman Dennis Gerlach reviewed progress on active projects.

#### e. Instrument Transformers

Chairman John Davis submitted a summary of activities (Attachment ASC-E).

TC - B  
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f. Audible Sound and Vibration

Chairman Allan Teplitzky indicated that the Test Code is ready to proceed to Main Committee ballot; Allen will attempt to utilize the Standards Department balloting service.

g. Insulation Life

Chairman Dave Douglas announced that Dave Takach will replace Bill Wrenn as Chairman of the Loading Guides Working Group.

At the Main Committee meeting, Dave will seek committee approval to upgrade IEEE 756 to full guide status.

h. Insulating Fluids

Chairman Henry Pearce submitted a summary of activities (Attachment ASC-F).

i. Dry Type

Chairman Roy Uptegraff indicated that he had no issues to bring before the group.

j. Bushings

Chairman Loren Wagenaar submitted a summary of activities (Attachment ASC-G). Issues related to revision of bushing power factor requirements were discussed.

10. TECHNICAL PAPERS

John Bergeron's report was submitted (Attachment ASC-H).

11. COMMITTEE MEMBERSHIP REVIEW

Secretary John Borst distributed updated copies of the invitation list. Member resignations include Don Cash, John Bergeron, A. Iverson and Dean Yannucci.

New members of the Main Committee were approved as follows:

Stan Lindgren - EPRI  
Peter Iijima - Bonneville Power Adm.  
Ramsis Girgis - ABB

TC-B  
5 OF 5

With these changes, membership stands at 124 including:

14 Emeritus  
110 Voting  
31 General Interest (28%)  
37 Users (34%)  
42 Producers (38%)

12. AWARDS

Dean Yannucci's report was submitted (Attachment ASC-I).

13. OLD BUSINESS

None

14. NEW BUSINESS

Due to John Bergeron's resignation, Main Committee Officers for the remainder of 1990 and all of 1991 will be as follows:

Chairman	Bob Veitch
Vice Chairman	John Borst
Secretary	Jim Harlow

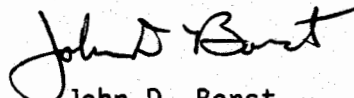
Note that this requires Bob Veitch to serve 3 years as Chairman to maintain continuity which was unanimously endorsed by the Subcommittee.

A replacement Standards Subcommittee Chairman has been selected and has accepted the position if company approval can be obtained.

A replacement Awards Subcommittee Chairman is needed (later in the week, Wally Binder agreed to fill this position).

There being no further business, the meeting was adjourned at 11:20 p.m.

Respectfully Submitted,

  
John D. Borst  
Secretary

ASC-A

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Transformers Committee

I E E E / P E S T R A N S F O R M E R S C O M M I T T E E

Administrative Subcommittee Meeting

Monday, March 26th, 1990 @ 6:30 p.m.

Marriott City Center Hotel, Denver, Colorado

A G E N D A

1. Introduction of Members & Guests
2. Approval of the Charlotte Meeting Minutes
3. Addition to and/or Approval of the Agenda
4. Committee Finances & Meeting Arrangements  
Felix Cook - Denver Host  
George Vaillancourt - Montreal Host
5. Status of ANSI C57 Committee and Discussion of  
ways and means to improve its effectiveness - S. Vogel
6. Review of "New" Transformers Committee  
Operating Manual - L. Savio
7. Review of PES Standards Co-ordinating Committee, Standards  
Projects and other Standards concerns - J. Harlow
8. Review of Technical Council Activities - R. A. Veitch
9. Subcommittees' Activities Discussions - Subcommittee  
Chairmen
10. Papers for Future Meetings - J. J. Bergeron
11. Committee and Subcommittee Membership Review - J. Borst
12. P.E.S. Awards - D. A. Yannucci
13. Old Business - Liaison Representatives
14. New Business
15. Adjournment

ASC-B  
1 OF 9

TO: Members of IEEE PES Transformers Committee  
Administrative Subcommittee  
March 26, 1990

Subject: Status Report - Transformer Standards

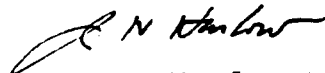
Following are topics of interest for period October 30, 1989 to March 26, 1990.

1. Active Transformers Committee Projects. A listing of project activity, by subcommittee, is included as attachment.
2. Many individual efforts are in process which are to be consolidated for the next revision of C57.12.00 and C57.12.90. Both of these standards are due for revision or reaffirmation in 1992. We need to target completion of all work involving these standards by the spring meeting of 1992 i.e. two years from now. Work complete or presently in process on these documents is included as Attachment II.
3. Status of Standards Submittals - The status of standards submissions to the Standards Board is included as Attachment III.
4. Report from meeting of Standards Coordinating Committee. February 5, 1990, Atlanta, GA.
  - a. There is a new document issued by the Standards Board "Working Guide for Submittal of Project Authorization Request (PAR) and PAR Form". This is effective January 1, 1990. PARs submitted prior to January 1, 1990, but not acted upon must be resubmitted using the new form. The new form requires the Working Group Chairman to state that he will not knowingly incorporate copyright or proprietary material without consent.
  - b. The second "Standards week" will be the week of September 23, 1990 in Pittsburgh.
  - c. The Standards Department is introducing new capabilities to support standards development activities. On request, the department will prepare and mail drafts and conduct balloting. The aspect of "conduct balloting" may be particularly useful as this includes member follow up ballots, acquisition of liaison ballots and compilation of results for RevCom submission. I encourage any Working Group which is approaching a final ballot stage to give this a try. The IEEE will require a list of member name with IEEE member number for this purpose.

ASC-B  
2 OF 9

- d. The Standards Manual is presently under revision. Three particular points which will be considered:
- Consistency as to status of ballots from Emeritus Members in percentage return calculations.
  - Regarding coordination within PES, does "coordination by circulation of drafts" require a ballot?
  - Is the coordinating Technical Committee permitted to submit more than one ballot?
- Apparently metrication will not be considered. The Standards Board will not dictate the use of metric units of measure.
- e. It will be required to submit a separate abstract of a standard upon submission to RevCom. This is to be 50 to 250 words giving the scope to the extent that a reader will be able to determine the relevance of the standard to his purpose.
5. The Transformers Committee PES representatives to Accredited Standards Committee C57 remains unchanged for 1990, as follows
- |                |   |
|----------------|---|
| L. Savio       | Head  |
| J. J. Bergeron | Representative  |
| J. W. Bonucchi | Representative  |
| J. D. Borst    | Representative  |
| J. Davis       | Representative  |
| R. A. Veitch   | Representative  |
| J. H. Harlow   | Alternate, and Accredited Standards Representative Coordinator for Transformers |
6. Liaison with other Technical Committees established in period = None.
7. A new C57 complete edition has just been published.
8. Ms. Sue Vogel, Administrator, Standards Department is with us for a portion of the meeting in Denver.

Respectfully submitted,

  
J. H. Harlow

cc: S. Vogel  
T. deCourcelle



# ASC-B

## 3 OF 9

Subcommittee: Audible Sound and Vibration				PAR		
Subcommittee Chairman: Allan M. Teplitsky (212/460-4859)				ON FILE		
IEEE	ANSI	WG/TF		TRANS		PES
<u>NO.</u>	<u>NO.</u>	<u>CHAIRMAN</u>	<u>IDENTIFICATION</u>	<u>COMM.</u>	<u>AS OF/STATUS</u>	<u>COORD.</u>
P523	PC57.112	A. Teplitsky	Guide for the Control of Transformer Sound	Yes (8/73)	11/1/89 - TF or WG to be established to start work	
	PC57.12.90b	A. Teplitsky	Transformer Sound Power Measurement	Yes (3/86)	11/1/89 - Resolving WG negative votes.	RM
Subcommittee: Bushing				PAR		
Subcommittee Chairman: Loren B. Wagenaar (614/223-2259)				ON FILE		
IEEE	ANSI	WG/TF		TRANS		PES
<u>NO.</u>	<u>NO.</u>	<u>CHAIRMAN</u>	<u>IDENTIFICATION</u>	<u>COMM.</u>	<u>AS OF/STATUS</u>	<u>COORD.</u>
P21	PC57.19.00	L. B. Wagenaar	General Requirements and Test Procedures for Outdoor Apparatus Bushings (Rev. of ANSI C78.1)	Yes (4/79)	1/31/90 - TC Ballot of D10	SWGR T & D PSR IC
P800	PC57.19.100	F. E. Elliott	Bushing Application Guide	Yes (4/79)	11/1/89 - WG ballot comments being resolved.	SWGR SUB PSR
	PC57.19.03	L. B. Wagenaar (Acting)	Standard Requirements, Terminology and Test Code for Bushings for DC Applications	Yes (11/89)	11/1/89 - WG review of first draft.	SPD IC SWGR
		L. D. Miller	TF Bushings for Distribution Transformers	None	11/1/89 - No interest. TF Required disbanded.	
24	PC57.19.01	L. B. Wagenaar	Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings	Yes (11/89)	1/31/90 Ballot TC re Table 9	SPD IC SWGR
Subcommittee: West Coast				PAR		
Subcommittee Chairman: Dennis Gerlach (602/236-5483)				ON FILE		
IEEE	ANSI	WG/TF		TRANS		PES
<u>NO.</u>	<u>NO.</u>	<u>CHAIRMAN</u>	<u>IDENTIFICATION</u>	<u>COMM.</u>	<u>AS OF/STATUS</u>	<u>COORD.</u>
P513	PC57.114	S. Oklu	Seismic Guide for Power Transformers and Reactors	Yes (7/73)	2/15/90 Approved by Std Bd w/condx	NPE Sub
P842	PC57.120	R. Jacobsen	Loss Evaluation Guide for Power Transformers and Reactors	Yes (5/80)	2/15/90 Approved by RevCom w/condx 3/12/90 Letters out for coordination.	Sub RM PG
	PC57.93	J. Gillies	Guide for Installation of Liquid Immersed Power Transformers (Including C57.12.11 and C57.12.12 Consolidation)	Yes (8/82)	11/1/89 - Review of D2	None
	PC57.128	H. Johnson	Fire Protection of Outdoor Liquid Immersed Power Transformers	Yes (6/89)	11/1/89 - D1 being prepared	NPE Sub PSR

# ASC-B 4 OF 9

Subcommittee: Dielectric Tests

Subcommittee Chairman: Robert E. Lee (215/398-5150)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS COMM.	AS OF/STATUS	PES COORD.
		H. R. Moore	WG on Revision of Dielectric Tests			
PC57.21a		W. N. Kennedy	TF on Revision of Dielectric Tests of Shunt Reactors	Yes (2/86)	11/1/89 - Report on work of PC 57.21	None
PC57.12.00j		R. A. Veitch	New section 6.8 - Minimum External Clearances Between Transformer Line Parts of Different Phases of same voltage.	Yes (2/86)	6/26/89 - Complete - Hold for C57.12.00 submittal	None
PC57.98		R. E. Minkwitz	TF Revision for Guide for Transformer Impulse Tests	Yes (2/86)	11/1/89 D1 Reviewed	None
PC57.12.90		W. S. Altman	Rev. Par 10.7.2 Enhancement Voltage Time	No	3/19/90 PAR being circulated to SCC	
		J. Rossetti	WG for Revision of Dielectric Testing of Distribution Transformers			
PC 57.12.90c		W. R. Henning	TF on Routine Impulse Test for Distribution Transformers	Yes (9/87)	11/1/89 D6 out for TC ballot	RM PSC
		R. E. Lee	TF on Low Side Surge Requirements for Distribution Transformers	None Required	11/1/89 D1 of position paper discussed	
		J. L. Puri	TF - Guide for Transformer Impulse Tests	No	11/1/89 PAR to be prepared will be in C57.98	
		G. H. Vaillancourt	WG on Partial Discharge Tests for Transformers			
		W. J. Carter	TF for Measurement of Apparent Charge	None Required	11/1/89 Considering changes to C57.113	
PC57.127		E. Howells	TF on Guide for the Detection of Accoustic Emissions From Partial Discharges in Oil-Immersed Power Transformers	Yes (3/88)	11/1/89 TC ballot acceptable Ready to be submitted to RevCom	T & D PG

# ASC-B 5 OF 9

Subcommittee: Dry Type Transformers

Subcommittee Chairman: Roy E. Uptegraff, Jr. (412/887-7700)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS COMM.	AS OF/STATUS	PES COORD.
	C57.21	R. Dudley (contribution)	Loading Dry Type Reactors	None Required	11/1/89 - Report on work of PC57.21	None
P259	None	A. M. Iverson	Standard Test Procedure for Evaluation of Systems of Insulation for Specialty Transformers	No	11/1/89 - D/4 Discussion	?
	PC57.96	W. H. Mutschler	Guide for Loading Dry Type Distribution and Power Transformers	No	11/1/89 WG looking into temperature related parameters.	PSR PSIM
	PC57.124	A. D. Kline	Recommended Practice for Measuring Partial Discharge and Measurement of Apparent Charge in Dry-Type Transformers	Yes	11/1/89 - Discussion re 06 (1/86)	None
	PC57.12.60	R. L. Provost	Standard Test Procedure for Thermal Evaluation of Insulation Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers	Yes (11/85)	11/1/89 - Awaiting liason responses. Then ready for RevCom	Un-clear
		R. L. Provost	Thermal Evaluation of Insulation Systems of Dry-Type Transformers above 600V	No	11/1/89 No report	
P745	PC57.12.58	A. D. Kline	Guide for Conducting Transient Voltage Analysis of a Dry-Type Transformer Coil	Yes (6/78)	4/12/89 TC voted to reapprove and resubmit to Std. Bd. 3/13/90 - Materials not yet received for submission	
	PC57.16	R. Dudley	Working: Requirements for Current Limiting Reactors	No	11/1/89 - Discuss D1 of proposed revision	
	C57.12.91	E. Koenig	Test Code for Dry-Type Distribution and Power Transformers	Yes (6/89)	11/1/89 - Second meeting of Task Forces	SPD RM

Subcommittee: Instrument Transformers

Subcommittee Chairman: John N. Davis (404/447-7388)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS COMM.	AS OF/STATUS	PES COORD.
P546	PC57.13		Standard Requirement for Instrument Transformers	Yes (5/80)	11/1/89 D6 review, esp. Tables 2 & 3.	PSR SPD
P670	C37.077	J. G. Reckleff (Joint w/Swgr)	Requirement for Current Transformers for use with AC-High-Voltage Circuit Breakers	No	3/19/90 - Per D. G. Kumbara, No switchgear activity Reckleff has resigned. Drop project.	
P832	PC57.13.4	A. J. Jonnatti	Detection of Partial Discharge and Measurement of Apparent Charge Within Instrument Transformers	Yes (10/79)	11/1/89 - No report	T & D

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Subcommittee: HVDC Converter Transformers and Smoothing Reactors  
 Subcommittee Chairman: William N. Kennedy (413/494-2322)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS COMM.	AS OF/STATUS	PES COORD.
	PC57.129	W. Kennedy	General Requirements and Test Code for Oil-Immersed HVDC Converter Transformers and Smoothing Reactors for DC Power Transmission	Yes (6/89)	11/1/90 D2 Discussion PAR to be revised to include dry-type reactors.	RM T & D

Subcommittee: Insulating Fluids  
 Subcommittee Chairman: Henry A. Pearce (412/983-4335)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS COMM.	AS OF/STATUS	PES COORD.
	PC57.108	F. W. Heinricks	Guides for Acceptance and Maintenance of Insulating Oil in Equipment	Yes (4/86)	11/1/89 D3 review	None
	PC57.104	H. A. Pearce	Guide for the Detection and Determination of Generated Gases in Oil-Immersed Transformers and Their Relation to the Serviceability of the Equipment	Yes (12/81)	11/1/89 - TC ballot of D8 returns discussed.	PSR T & D
	PC57.130	J. P. Kinney	Guide for the Detection and Identification of Gases in Oil-Immersed Transformers During Factory Tests	Yes (6/89)	2/22/90 D2 sent to WG	None

Subcommittee: Insulation Life  
 Subcommittee Chairman: David H. Douglas (216/447-3370)

IEEE NO.	ANSI NO.	WG/TF CHAIRMAN	IDENTIFICATION	PAR ON FILE TRANS COMM.	AS OF/STATUS	PES COORD.
	PC57.91	W. E. Wrenn	Guide for Loading Mineral Oil-Immersed Transformers	Yes (3/85)	11/1/89 - Inputs of 4 TF being reviewed.	Sub T & D PSE
	PC57.100	L. A. Loudermilk	Standard Test Procedure for Thermal Evaluation of Oil-Immersed Distribution and Power Transformers	Yes (10/88)	11/1/89 - Discussion re Models	NPE RM T & D SPD
P838	PC57.119	R. L. Grubb	Recommended Procedures for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Rating	Yes (9/80)	3/4/90 - D11 to TC ballot.	SWG SUB PSR
	PC57.12.00L	R. L. Grubb	Revise Section 8, define thermal duplicate	No (pending)	11/1/89 Preliminary Discussion 3/13/90 PAR sent to NesCom	RM

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Subcommittee: Performance Characteristics

Subcommittee Chairman: John W. Matthews (301/281-3775)

IEEE      ANSI      WG/TF  
NO.      NO.      CHAIRMAN

IDENTIFICATION

PAR

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Consolidated Changes to C57.12.00-1987

P462C (1)	PC57.12.00	W. R. Henning	Revision of Sec. 5.9 Reference Temp. for No-Load Loss	Yes (6/79)	11/1/89	No report.	PSIM T & D
P462C (2)	PC57.12.00	W. R. Henning	Addition to Sec. 9.3.1 Accuracy Requirements for Measured Losses	Yes (6/79)	11/1/89	No report.	PSIM T & D
	PC57.12.00h	R. H. Frazer	TF - change Sec. 5.12 "Nameplate Voltage Note changes for LTC"	Yes (9/86)	11/1/89	Awaiting returns on D1 ballot	None
	PC57.12.00i	J. W. Matthews	TF - Nameplate Info "Directed Flow"	Yes (12/86)	11/1/89	Work on hold pending definitions	None
	PC57.12.00k	C. J. McMillen	TF - Change Table 16 Routine Resistance Test	No	11/1/89	Successful ballot of TC	

Consolidated changes to C57.12.90-1987

P262 E3	PC57.12.90	W. R. Henning	General Revision of Sec. 8 No-Load Losses and Excitation Current	Yes (8/79)	11/1/89	Awaiting subcommittee ballot returns	PSIM T & D
P262E	PC57.12.90	W. R. Henning	General Revision of Sec. 9 Impedance and Load Losses	Yes (6/79)	11/1/89	Awaiting subcommittee ballot returns	PSIM T & D
			Sec. 7.3, Figures 9 & 10 reversed		4/11/89	Hold for C57.12.90 submittal	
P1098	PC57.123	W. R. Henning R. Girgis	Guide for Transformer loss Measurement	Yes (3/85)	11/1/89	Discussion re No Load Loss portion	PSIM
P638	None	L. R. Stensland	Qualification of Class 1E Transformers for Nuclear Power Generating Stations	Yes	11/1/89	Results of D17 TC Ballot discussed	NPE SUB
	PC57.18.10	C. G. Pounds	Practices and Requirements for Semiconductor Power Rectifier Transformers	Yes (8/81)	11/1/89	Working on D6	None
	PC57.21	J. W. McGill	Requirements, Terminology, and Test Code for Shunt Reactors over 500 KVA	Yes (8/88)	11/1/89	Discussion re results of D9 TC ballot	RM T & D PSR
	PC57.125	W. B. Binder	Guide for Failure Investi- gation, Documentation and Analysis for Power Trans- formers and Shunt Reactors	Yes (2/87)	2/21/90	D9 out to TC ballot	T & D PGS PSE SWGR
	PC57.131	T. P. Traub	Standard Requirements for Load Tap Changers	Yes (8/89)	11/1/89	Discussion re D2	RM T & D

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### ATTACHMENT II

Work complete or presently in process regarding C57.12.00 and C57.12.90

C57.12.00

<u>Sub-Comm</u>	<u>Project ID</u>	<u>Description</u>	<u>Status</u>	<u>WG Chmn</u>
Perf Char.	PC57.12.00 P462C(1)	Rev of Sec. 5.9 Reference temperature for no-load loss	No report from Charlotte	Henning
Perf Char.	PC57.12.00 P462C(2)	Add to Sec. 9.3.1. Accuracy requirements for measured losses	No report from Charlotte	Henning
Perf Char.	PC57.12.00H	Change Sec. 5.12 Nameplate voltage note changes for LTC	Awaiting returns on D1 ballot	Frazer
Perf Char.	PC57.12.00I	Nameplate info: Directed Flow	Work on hold, pending definitions	Matthews
Diel. Tests	PC57.12.00J	New Sec. 6.8 Minimum external Clearances between live parts	Complete, RevCom documentation ready	Veitch
Perf Char.	PC57.12.00K	Change Table 16 - Routine Resistance Test	Complete, RevCom documentation pending	McMillen
Insul Life	PC57.12.00L	Sec. 8 Define Thermal Duplicate	Work just starting	Grubb

C57.12.90

<u>Sub-Comm</u>	<u>Project ID</u>	<u>Description</u>	<u>Status</u>	<u>WG Chmn</u>
Perf Char.	PC57.12.90 P262E3	Rev Sec 8. No-load losses and excitation current	Awaiting Subcommittee ballot returns	Henning
Perf Char.	PC57.12.90 P262E	Rev Sec. 9 Impedance and Load Losses	Awaiting Subcommittee ballot returns	Henning
Aud. Sound & Vib.	PC57.12.90B	Transformer Sound Power Measurement	Resolving WG negative votes	Teplitsky
Diel. Tests	PC57.12.90C	Routine Impulse Test for Distribution Transformers	D6 out to TC ballot	Henning
Diel. Tests	PC57.12.90D	Para 10.7.2 Rev. Induced Test Enhancement voltage time	Work just starting	Altman
Perf Char.	None	Sec. 7.3, Figures 9 & 10 Reversed	Ready	---

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### Attachment III

#### STATUS OF STANDARDS SUBMITTALS - AS OF MARCH 19, 1990

<u>SubCom</u>	<u>Number</u>	<u>Title</u>	<u>Std Bd Approved</u>	<u>Published IEEE</u>	<u>C57 Approve</u>	<u>ANSI Approve</u>	<u>Comments</u>
Insul Fluids	PC57.111	Guide for Acceptance of Silicone Insulating Fluid and its Maintenance in Transformers	2/2/89	9/11/89	pending		C57 ballot initiated 3/15/89
Dry Type	PC57.12.01	General Requirements for Dry-Type Distribution and Power Transformers	2/2/89	12/27/89	pending		C57 ballot initiated 3/15/89
Dry Type	PC57.12.59	Dry-Type Transformer Through Fault Current Duration Guide	6/1/89	12/1/89	pending		C57 ballot initiated 6/15/89
Insul Fluids	PC57.121	Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid in Transformers	12/87 w/condx	12/15/89	pending		C57 ballot initiated 1/30/89
Perf. Char.	PC57.116	Guide for Transformers Directly Connected to Generators	1/30/89	9/29/89	Yes	1/25/90	Complete
Bush	PC57.19.101	Guide for Loading Apparatus Bushings	10/20/89	7/17/89	Yes	10/20/89	Complete
Dry Type	C57.94	Recommended Practice for Installation, Application, Operation and Maintenance of Dry-Type General Purpose Distribution and Power Transformers	12/10/87 (reaffirmed)	na	C. White to advise		C57 ballot initiated 12/14/87
Diel. Tests	PC57.113	Trial Use Guide For Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors					On 5/30/90 RevCom agenda for upgrade to full status.
West Coast	PC57.114	Seismic Guide for Power Transformers and Reactors	2/15/90 w/condx				condx: Receipt of coordination documentation
West Coast	PC57.120	Loss Evaluation Guide for Power Transformers and Reactors					2/15/90 RevCom Recommend approval subject to coordination documentation



IEEE

ASC-C  
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**TRANSFORMERS  
COMMITTEE**

IEEE/PES TRANSFORMERS COMMITTEE

POWER  
ENGINEERING  
SOCIETY

Please Reply To:

Chairman's Report

March 25 - March 28, 1990  
Denver, Colorado

Report from the Technical Council (TC):

The PES Technical Council met at the Winter Power Meeting in Atlanta, GA on February 6, 1990. The following are highlights from this meeting.

(1) Scope Changes. At long last, the revised scope of the Transformers Committee and the scope of the new HVDC Converter Transformer and Smoothing Reactor Subcommittee, have been approved by the Technical Council. With this approval, Leo Savio has now been able to complete the new edition of the Transformers Committee Operating Manual. This will be reviewed by the Administrative Subcommittee on March 26 and it is hoped that the final printed version will be ready shortly thereafter.

The approved scopes were given in the minutes of the November 1, 1989 Transformers Committee meeting in Charlotte, N.C. and are not repeated in this report.

(2) Technical Committee Meetings and Related Commercial Activities.

You will remember that at the November 1, 1989 meeting of this committee, a question was raised from the floor concerning the offer of a plant tour by Square D to only a portion of the committee members. The invitation for the plant tour was mailed with the "official" invitation to the Transformers Committee meeting.

The matter of restricting attendance to a particular group of members for plant tours, seminars, etc., which are being held in conjunction with, but not part of, a Technical Committee meeting was discussed by the Technical Council. The following statement was unanimously accepted by the Technical Council.

PES Technical Committee meetings present a unique opportunity for commercial interests to contact individuals or groups of individuals which may have an interest in their products, manufacturing facilities or services. For the overall good of both parties, such activities are not discouraged. If not open to all attendees and included in the meeting scheduling, such activities shall be external to all scheduled meeting events, transparent to planned activities of the meeting and handled separately from any IEEE/PES activity.

This statement will be included in a future revision of the by-laws of PES.



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2 OF 3

Report from the Executive Board Meeting of November 2, 1989

1. PES President H. N. Scherer, Jr., discussed the need for a set of objectives for 1990. A copy of these objectives, marked Appendix A is attached.

2. A proposal by the Technical Council to have all papers that are presented at the T&D Conference (both Conference Record and Transactions Type) to be published in a Conference Record was passed unanimously by the Executive Board. Each registrant at the T&D Conference will receive a copy of this Conference Record.

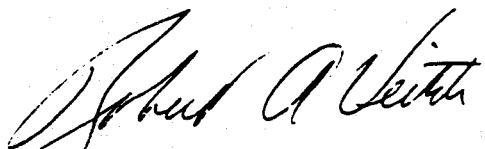
3. The Technical Council was assigned the task of writing a document for distribution by the President of the PES and for publishing in the Review that will stimulate the writing of and acceptance of "practical" Transactions Papers.

4. The report of the Strategic Planning Committee, chaired by C. L. Wagner, presented a list of 15 items of concern. Each item was reviewed under the headings, Problem, Background, Discussion and Recommendation. All items were accepted by the Executive Board. The following is a list of items covered in this report:

- Item 1 - PES Presentation Before Publication Policy
- Item 2 - Practical Papers
- Item 3 - Conference Record Papers Versus Transactions Papers
- Item 4 - Conference Record Publications
- Item 5 - Unbundling Papers and Publications
- Item 6 - Non-North American Conferences
- Item 7 - Panel Session Papers
- Item 8 - Paper Presentation at Committee Meetings
- Item 9 - Lack of Attendance and Discussions
- Item 10 - Lack of Discussions
- Item 11 - Interpretation at Presentation Sessions
- Item 12 - Publicizing of Paper Preprints
- Item 13 - Preprint Discussions
- Item 14 - Paper Discussion Printing Procedure
- Item 15 - Paper Printing Schedule

Copies of this Report have been given to each member of the Administrative Subcommittee.

RAV:SH



R. A. Veitch  
Chairman  
Transformers Committee

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APPENDIX A

IEEE POWER ENGINEERING SOCIETY - 1990 GOALS

The Executive Board of the Power Engineering Society has adopted the following seven goals to guide our overall activities through the year 1990.

1. To enhance membership services by emphasizing the quality and relevance of conferences and publications, by broadening the support to the Society's chapters, both within and outside of the United States, and by finding additional ways to encourage and recognize engineering excellence and professional achievement.
2. To expand membership by strengthening existing chapters, expanding student chapters, enrolling young engineers in the Society, and identifying the various levels and ways within the PES organization where members can participate.
3. To search out additional ways of meeting the needs of our international membership, to actively promote activities in this regard, and to develop improved approaches to the problems and opportunities resulting from increasing global communications and ongoing structural changes in the power equipment manufacturing industry.
4. To increase the awareness of electric utility, power industry, and university managements of the importance of power engineering and of the maintenance of in-house technical capability.
5. To further strengthen relationships with institutions concerned with the status of power engineering such as utility trade associations, universities, research institutes, and reliability councils.
6. To further address power engineering education at all levels, including grades 9 to 12 or before, as well as post graduate continuing education.
7. To actively participate in discussions on public policy at the local, state, and federal levels when power engineering expertise can contribute to a better understanding of the issue.

ASC-D

1 OF 1

DIELECTRIC TESTS SUBCOMMITTEE  
ACTIVITIES  
ADMINISTRATIVE SUBCOMMITTEE - 3/26/90

1. Membership - 58
2. Standards Activities
  - a. Bill Kennedy - PC57.21/D10 - Requirements, Terminology and Test Code for Shunt Reactors over 500 kVA (Sections 6, 9, and 10).  
  
Balloted at the Committee level by Jack McGill.
  - b. Bill Henning - PC57.12.90c/D6 - Routine Impulse Test for Distribution Transformers.  
  
Committee level ballot conducted during December, 1989.
  - c. Ed Howells - PC57.127/D2 - Trial Use Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers.  
  
Committee level ballot conducted during October 1989.
  - d. Georges Vaillancourt - C57.113 "Trial-Use Guide for Apparent Charge Measurement in Oil-Filled Power Transformers and Shunt Reactors"  
  
Balloted at the Committee level.  
  
Submitted to RevCom for adoption as a full-use guide. Submission includes the two negative ballots and explanatory material.
3. IEEE/PES T&D Conference and Exposition - Dallas - 1991. The Task Force on Low Side Surge Requirements for Distribution Transformers has accumulated a significant amount of information on the subject. A Panel or Technical Session at the T&D Expo would present an excellent forum to further the knowledge of the Industry. Comment/guidance from the Administrative Subcommittee?

*Robert E. Lee*

Robert E. Lee  
March 23, 1990

ATTENDANCE LISTING - DENVER MEETING - MARCH 1990

MEMBERS PRESENT:

D.J. ALLAN	J.P. KINNEY, JR.	W.B. UHL
B.F. ALLEN	E.K. KOENIG	R.E. UPTGRAFF, JR
R. ALLUSTIARTI	J.G. LACKEY	G.H. VAILLANCOURT
M.S. ALTMAN	R.E. LEE	R.A. VEITCH
J.C. ARNOLD	S. LINDGREN	L.B. WAGENAAR
D.A. BARNARD	L.A. LOWDERMILK	W.E. WRENN
D. BASEL	R.I. LOWE	
W.B. BINDER	M.L. MANNING	
J.V. BONUCCHI	T. LASSOUDA	
J.D. BORST	J.W. MATTHEWS	
D.J. CASH	S.P. MEHTA	
O.R. COMPTON	C.K. MILLER	
F.W. COOK, SR.	R.E. MINKWITZ, SR.	
J. CORKRAN	M.I. MITELMAN	
D.W. CROFTS (D. ROSE)	H.R. MOORE	
J.N. DAVIS	W.E. MOREHART	
D.H. DOUGLAS	W.H. MUTSCHLER, JR.	
R.F. DUDLEY	J.W. MCGILL	
D.J. FALLON	C.J. MCMILLEN	
M. FRYDMAN	W.J. MCNUIT	
R.E. GEARHART	E.T. NORTON	
D.W. GERLACH	B.K. PATEL	
D.A. GILLIES	W. PATTERSON	
R.L. GRUBB	H.A. PEARCE	
F.J. GRYSKIEWCZ	D. PERCO (J. FOLDI)	
J.H. HARLOW	L.W. PIERCE	
F.W. HEINRICHS	L.J. SAVIO	
W. HENNING	W.E. SAXON	
K.R. HIGHTON	D.N. SHARMA	
C.R. HOESEL	V. SHENOY (V. SANKAR)	
R.H. HOLLISTER	W.W. STEIN	
E. HOWELLS	L.R. STENSLAND	
P. IIJIMA	L. SWENSON	
D.L. JOHNSON	A.L. TANTON	
A.J. JONNATTI	A.M. TEPLITZKY	
C.P. KAPPELER	V. THENAPPAN	
J.J. KELLY	T.P. TRAUB	
W.N. KENNEDY	D.E. TRUAX	

MEMBER ATTENDANCE SUMMARY

	PRESENT	ABSENT
	-----	-----
MEMBERS	82	43
VOTING MEMBERS	82	29

MEMBERS ABSENT:

E. J. ADOLPHSON  
L. C. AICHER  
J. AUBIN  
R. BANCROFT  
P. L. BELLASCHI  
S. BENNON  
C. V. BROWN  
J. C. DUTTON  
J. K. EASLEY  
J. A. EBERT  
S. L. FOSTER  
H. E. GABEL, JR.  
R. S. GIRGIS  
G. HALL  
P. J. HOEFLER  
C. C. HONEY

G. W. ILIFF  
C. HURTY  
R. G. JACOBSEN  
D. C. JOHNSON  
R. B. KAUFMAN  
B. KLAPONSKI  
A. D. KLINE  
H. F. LIGHT  
L. W. LONG  
H. R. MARGOLIS  
C. MILLIAN  
R. J. MUSIL  
R. A. OLSSON  
J. W. POLLITT  
C. T. RAYMOND  
C. A. ROBBINS

R. B. STETSON  
E. G. STRANGAS  
D. W. SUNDIN  
D. S. TAKACH  
R. C. THOMAS  
J. A. THOMPSON  
R. J. WHEARTY  
A. WILKS  
A. C. WURDACK  
E. J. YASUDA

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1 of 1

IEEE/PES TRANSFORMER COMMITTEE  
INSTRUMENT TRANSFORMER SUB-COMMITTEE

Administrative Sub-committee Report  
March 26, 1990  
Denver, Col.

1. P546/D7 ("Standard Requirements for Instrument Transformers") has been prepared. The subcommittee will review the draft which is virtually unchanged from draft 6 except for changes in BIL and dielectric tests.
2. The use of "smart electronic meters" in revenue metering may require changes in secondary voltage and current levels to match the requirements of the electronic input. This will not affect P546/D7 at this time. The sub-committee will follow and discuss industry trends.
3. Partial discharge testing may involve issuing separate guides for liquid-immersed and for dry-type instrument transformers.

Respectively submitted,

John N. Davis, Chairman

ASC-F  
1 OF 1

INSULATING FLUIDS SUBCOMMITTEE

March 26-27, 1990

1. The Insulating Fluids Subcommittee will review and discuss the ballots on Draft 9 of the gas Guide - **C57.104**.
2. Draft 4 of the Oil Guide has been prepared and sent to the Subcommittee members. This is **C57.106**. This draft will be discussed at the March meeting.
3. The Guide for Gas Analysis During Factory Test - **C57.130** - will be put together, and a draft should be available for review.
4. These three items should keep the Insulating Fluids Subcommittee busy!

Henry Pearce  
Chairman

3/16/90

# ASC-G 1 OF 1

## Administrative Subcommittee Meeting

March 26, 1990

We may have a situation at the Bushing Subcommittee meeting tomorrow on which I need some guidance. The situation involves Table 10 of C57.19.01 (ANSI/IEEE 24), which give the power factor and capacitance limits for all types of bushings. Table 10 in the existing standard specifies a maximum limit of 1% for oil-impregnated, paper-insulated bushings. Drafts 1 and 2 of the revised table lowered this limit to 0.5%, which is more in the region where new bushings of this type are presently testing. A negative vote was received on a Bushing Subcommittee ballot of Draft 2 from a manufacturer's representative on the basis that the 0.5% limit "is too restrictive" for the manufacture of this type of bushing.

We resolved the negative vote at the Charlotte meeting by increasing the limit to 0.55%. However, a member of the Bushing Subcommittee not at the Charlotte meeting has since objected to the change. He has given several good reasons why the limit should be kept at 0.5%: First, many bushing manufacturers are producing bushings with power factors in the range of 0.2 to 0.3% and 0.5% is certainly obtainable if bushings are manufactured in a clean, dry environment. Second, most of the bushings of this type which this particular manufacturer produces are within the 0.5% limit. Third, field practice for judging the integrity of an older bushing is to start watching it more closely when its power factor doubles from the nameplate reading. However, some confusion arises when you need to closely monitor a bushing whose original power factor was 0.25% doubles to 0.5%, whereas there is no concern for a bushing whose original power factor is 0.55 until it reaches 1.1%.

My guess is that the majority of the Bushing Subcommittee members favor the 0.5% limit. However, I have another concern. In the NEMA JSC on Bushings, there were a couple of instances where such a limit was not standardized because "standards can not be established when a manufacturer might be hurt by that standard." Are we under a similar constraint in this case?

Loren Wagenaar  
Bushing Subcommittee



ASC-H  
1 OF 5

Report on Technical Papers for  
1990 WPM and 1990 SPM

The Transformers Committee Session at the 1990 WPM featured Five technical papers dealing Harmonics Losses in DC Transformers, Transient Analysis, Harmonic Analysis, Cellural Neural Networks for Eddy Current Analysis and Transformer Modeling. Altogether, 14 papers were submitted of which five were presented, two were carried over for mandatory changes, three were carried over for review due to excessive length, and four were rejected. The Transformers Session was attended by approximately 45 people.

At this time, 14 papers are under review for the 1990 SPM Transformers Session. Of these 14 papers, three were mandatory revisions which have been accepted, thereby leaving 11 papers in competition for our remaining two presentation slots and four publication slots. Therefore, the final acceptance and scheduling of papers for this meeting will be a problem.

We also have three papers under review for the 1990 India Conference and one paper under review for the Hungary Conference. If accepted for Transactions, these papers would also count against our publication limit of seven papers per year.

The paper limit is beginning to cause problems for us as we cannot publish all of the accepted papers. The Publications Committee Chairman indicated that we should grade harder, however, our rejection rate is already relatively high. I believe the problem will have to get a bit worse before we can obtain a reconsideration of these limits.



John J. Bergeron  
Vice Chairman  
Transformers Committee

# ASC-H

## 2 OF 5

TECHNICAL SESSIONS IMPROVEMENTS COMMITTEE IEEE/PES

WINTER POWER MEETING

FEBRUARY 6, 1990, ATLANTA, GEORGIA

I attended the Technical Sessions Improvement Committee Meeting which was conducted at the 1990 Winter Power Meeting. The entire two hours of this meeting was devoted to a discussion of the review of visuals which will be supplied by authors for their papers. Many problems with this process were discussed. The amount of time allocated for authors to prepare and forward visuals, as well as the amount of time which the committees have to review the visuals, is very limited and as a result numerous difficulties have developed. It was decided that no papers will be rejected on the basis of improper visuals for the next Summer Power Meeting and possibly even the next Winter Power Meeting. It was also decided that a good set of instructions, and examples of proper visuals, will be developed to accompany acceptance letters to authors. The examples will include lettering techniques, proper letter size, line clarity, and suggested use of colors. Some committees will be delegating the review of visuals to other committee members or subcommittee chairmen, however, we do not see the necessity of doing so for the Transformer Committee and Vice-Chairman will continue with this responsibility.

NOTE: The Transformers Committee session at this meeting had three authors which utilized overhead transparencies. Of the three authors with overhead transparencies, two authors had overhead which were reasonably well done and easy to follow. One author utilized transparencies which contained much typed information and these transparencies were difficult to read from the rear of the room. Suggestion for improvement had been sent to this author, however, no improvement had been made.

John J. Bergeron  
Vice Chairman  
Transformers Committee

jjb02129

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REPORT ON IEEE/PES PUBLICATIONS COMMITTEE MEETING

FEBRUARY 5, 1990

WINTER POWER MEETING, ATLANTA, GEORGIA

I attended the meeting of the Technical Council Publications Committee at the Winter Power Meeting. A summary of the major points covered follows:

An inquiry was made as to whether an author may submit a closure to a paper if no written discussion had been submitted. It was decided that this was inappropriate and that an author may only submit a closure if a written discussion is submitted. A written response to an oral discussion is inappropriate.

Reviewers were warned to make substantive checks of the references used in papers to ensure originality. Concern was voiced that insufficient references are included and that some work is being published which is not original.

A procedure will be developed to have automatic carry over until the next meeting should there be a shortage of appropriate space for paper presentations. A form letter will be developed which will be sent to the author which will advise that his paper is being carried over.

There is considerable discussion of the use of electronic mail within the committee. The PES is apparently preparing itself to accept papers by electronic mail, however, this will not be soon as a lengthy development period will be required.

The page limits for the transactions require that limits of 210 papers for the summer meeting and 240 papers for the winter meeting be enforced.

Should the Transformers Committee hold a technical paper session at their meetings, the number of papers submitted will count against their total allocations of papers, because the total numbers of printed pages is the limiting requirement for papers which can be considered.

The average rejection rate for papers within the Power Engineering Society is 50%. The Transformers Committee rejection rate is approximately 65%.

An interim approval process for panel sessions has been adopted. A final procedure will be developed, however, it will closely

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parallel the published interim rules. The number of panel sessions will be limited by review of members of the Publication Committee for timeliness of topic, coordination between committees, and space availability.

The 1990 Winter Power Meeting paper allocation for the Transformers Committee is 7 papers. We have been allocated one standard slot for our paper presentations on Wednesday afternoon as was done at the 1989 Winter Power Meeting.

John J. Bergeron  
Vice Chairman  
Transformers Committee  
February 8, 1990

jjb02119

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TECHNICAL COUNCIL ORGANIZATION AND PROCEDURES MEETING IEEE/PES

FEBRUARY 6, 1990, WINTER POWER MEETING, ATLANTA, GEORGIA

I represented Leo Savio at this meeting. Discussion centered around the organizational procedures manual which the committee is attempting to assemble. However, the chairman of the committee, Mr. J. S. Edmonds, has insufficient time to tackle this assignment himself and has requested volunteer members of the committee to do so. An independent draft has been developed to date, however, it must be correlated and smoothed into one document. This was intended to be a "mother" document for all of the Operating Committee manuals of the various technical committees. However, much work will be needed before this document is in acceptable form for this purpose. At present, the document is highly generic with respect to the Technical Council and discusses requirements such as membership on a broad base.

I recommend that we reissue our Transformers Committee Operational Manual as soon as possible. The development of an overall guide is at least one to two years away, thereby precluding any immediate benefit from its development. Recent conversation with Robert Veitch indicates that our manual revision is ready. Thus, I feel we should proceed with dissemination.

John J. Bergeron  
Vice Chairman  
Transformers Committee

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TO: IEEE ADCOM and Transformer Committee

SUBJECT: Awards Sub-committee Report

CERTIFICATE OF APPRECIATION AWARDS

Certificate of appreciation awards were given to the following:

JOHN J. BERGERON

"For services as past secretary of the IEEE Transformer Committee"

ROBERT E. LEE

"For past services as Chairman of the Dielectric Tests Subcommittee of the IEEE Transformers Committee."

The Transformer Committee submitted the paper for the PES Prize Paper Award:

"A Refined Mathematical Model for Prediction of Bubble Evolution in Transformers" by W. A. Fessler, T.O. Rouse, W. J. McNutt and O. Compton.

We were notified that this paper has been selected as a co-winner for the 1989 PES Prize Paper Award.

Other award selections were as follows:

PRIZE PAPER Co-Winner

"Adaptive Transmission Relaying Concepts for Improved Performance" by Rockefeller, Wagner, Linders, Hicks and Rizy  
Power Systems Relaying Committee

WORKING GROUP RECOGNITION - STANDARD OR GUIDE

"Guide for AC Generator Protection, ANSI/IEEE C37.107-1987

Power System Relaying

WORKING GROUP RECOGNITION - TECHNICAL REPORT

"Inadvertant Energizing Protection of Synchronous Generators"

IEEE Transformers on Power Delivery

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POWER SYSTEM RELAYING

It has been my privilege to serve as Chairman of the Awards Sub-committee. I wish the committee well.

*Dean*

D. A. Yannucci  
Vice President and General Manager  
ABB POWER T&D COMPANY INC.

1123H/3

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IEEE TRANSFORMERS COMMITTEE

AUDIBLE SOUND AND VIBRATION SUBCOMMITTEE

DENVER, COLORADO

MARCH 27, 1990

Minutes

Chairman Allan Teplitzky opened the meeting at 10:05 a.m. with 10 members and 16 guests present.

Minutes of the October 31, 1989 meeting in Charlotte, North Carolina were approved.

Results of Draft 10 of the proposed revision of the audible sound measurement portion of C57.12.90 were presented. One negative vote was received based on a desire to include acoustic intensity measurements in the standard. This is not either common in the industry nor practical at this time. The negative vote was therefore considered resolved.

The use of arithmetic or logarithmic averaging of sound pressure level was discussed with a decision made to include both. A caution will be added that the arithmetic average will be up to 1 db lower than the logarithmic average.

Some minor changes will be made to reconcile the standard with the shunt reactor standard. All references to reactors will be removed as this standard is for transformers only.

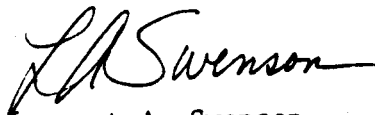
With the above changes the proposed revision will now go to the main Transformer Committee. Allan announced that the balloting of the main committee will be done by IEEE. This may be the first Transformers Committee ballot handled by IEEE.

Bill McNutt suggested we check with IEEE staff as to whether this subcommittee should assume responsibility for the NEMA TR 1 transformer sound levels. A letter will be sent by the secretary to NEMA to verify their intentions.

Work on the siting guide has not started. Allan indicated the task will not be too complex as much work has already been done in other projects.

The meeting was adjourned at 11:30.

Respectfully submitted,



Lennart A. Swenson  
Secretary, Audible Sound  
& Vibration Subcommittee



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BUSHING SUBCOMMITTEE

Report to the Transformers Committee

March 28, 1990

The Bushing Subcommittee met on Tuesday, March 27, 1990 with 11 members and five guests present. The following three people have requested membership on the subcommittee, bringing the total subcommittee membership to 29 persons:

Vince Dahinden - H. Weidman  
Carolyn Komlenic - Cooper Power Systems  
David Parr - Georgia Power Company

After introductions and approval of the minutes of the Charlotte meeting, the subcommittee heard the reports of the two working groups.

Chairman Fred Elliott reported that the Working Group on the Bushing Application Guide met on Tuesday morning (3/27) with six members and 15 guests present and reviewed the results and comments of the working group ballot on Draft A of PC57.19.100, Guide for Application of Apparatus Bushings. Ten ballots were sent out and nine were returned with six approved, two approved with comments and one not approved. The negative vote and all comments were resolved. The effects of ultraviolet (uV) radiation were also discussed and a caution will be included in Draft 5 that gaskets are very susceptible to uV radiation under hot, humid weather conditions. Draft 5 will be balloted in the Bushing Subcommittee.

The working group also reviewed the results of a separate ballot on newly written section to derate the bushing current when applied in transformer top oil rises between 55 and 60°C. Of the ten ballots sent out, nine were returned with two approved, two approved with comments and five negative. Four of the negative votes were resolved and a resolution is in the making on the remaining negative comment. A revision will be reballotted within the working group.

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Acting Chairman Wagenaar reported that the Working Group on Bushings for DC Applications met on Monday afternoon (3/26) with eight members and four guests present. It was reported that the PAR for this project, PC57.19.03, had been approved. A reply was also heard from the Substations Committee concerning our request for their opinion of our proposal to include vertical and horizontal condenser bushings for converter halls in the new standard. The Substations Committee agrees that the new standard is the appropriate location and also suggests that our working group also consider dry-type and SF6 bushings. This suggestion was discussed at the working group meeting and the need for the dry-type and SF6 bushings is not apparent. We will contact the Substations Committee through the liaison established during our previous correspondence.

The working group then continued its work on the initial draft of the new standard. It was decided that a table will be made up to better define the necessary routine and design tests. It was also decided that the routine and design tests on all bushings will consist of a sequence of ac tests, dc tests, including a polarity reversal test, and a final ac test. The previous agreement was to do the final ac tests on only bushings rated over 300kV.

This concluded the working group reports. The Subcommittee then reviewed the results and comments of the Transformer Committee ballots of PC57.19.00/d10 (old IEEE 21) and Table 9/d3 (partial discharge limits) of PC57.19.01 (old IEEE 24). The results of the ballot are tabulated below:

	PC57.19.01	
	<u>PC57.19.00</u>	<u>Table 9</u>
Ballots Sent Out	108	108
Ballots Returned	72 (67%)	82 (76%)
Affirmative	58	70
Affirmative w/Comment	9	2
Negative	2	0
Not Voting	3	10

It was noted that the C57.19.00 ballot is not yet valid since a 75% return has not yet been achieved and that an attempt will be made to gather the necessary

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ballots. The two negative ballots of C57.19.00 were resolved, but because they and one other change prompted by a comment from a liaison of another committee are substantive in nature, the changes will be balloted within the Subcommittee before they are balloted within the Transformers Committee.

Both of the comments of Table 9 were editorial in nature and the ballot is considered to have passed the Transformers Committee. Table 9 will be submitted to the IEEE Standards Board when all ballots are received from all liaison to other committees and the other tables in C57.19.01 have been approved.

The last topic of business for the Bushing Subcommittee concerned Table 10 of C57.19.01. At the Charlotte meeting, a negative ballot within the Subcommittee was resolved by increasing the power factor limit on oil-impregnated paper-insulated bushings from 0.5% to 0.55%. However, this change brought about an objection from another subcommittee member. After a thorough discussion of the subject, it was decided to set the limit at 0.55%. This change, plus another substantive change resulting from a second negative ballot, will be included in draft 3 of Table 10 and Table 10 will be reballoted within the Subcommittee.

L.B. Wagenaar  
Chairman

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Minutes of the March 26, 1990 Meeting of the  
HVDC Converter Transformer and Smoothing Reactor Subcommittee  
Denver, CO.

The meeting was called to order at 8:00 AM with ten members and five guests present. A new member was added, Mr. Vince Dahinden from H. Weidmann AG, Rapperswil, Switzerland. The first item to be discussed after the minutes of the last meeting in Charlotte was the March 22-23 meeting of the CIGRE JWG 12/14-10 in Montreal. An update on their activities as described in our previous minutes is given below.

- o Harmonic Losses - Mr. Alan Forrest from Teshmont presented a paper at the IEEE Winter Power Meeting which supplemented a 1988 paper by Ram, Forrest, and Swift. The new paper describes measurement results on a single-phase converter transformer (the original paper showed results on a three-phase converter transformer) and presented an analytical method to calculate the losses as a function of the impedance and percent stray loss of the transformer, and the firing angle. At the CIGRE meeting results were presented on two converter transformers and a generator step-up transformer by a second manufacturer and the results of the converter transformers were in close agreement with the results from the published papers.
- o Specifications - This paper that the CIGRE group is preparing has gone through numerous drafts and is expected to be ready for publication in ELECTRA shortly.
- o Noise Measurement - This item has been identified as needing additional work. Two manufacturers have volunteered to summarize their experiences for the next meeting of the group in August.
- o Dielectric Testing - This paper has also gone through several revisions. In the most recent draft polarity reversal stress calculations have been added which show that the polarity reversal test can achieve stress levels which are usually at least comparable to those developed during ac + dc long-term operating conditions. There was considerable discussion in the working group regarding the validity of the equivalence between the polarity reversal test and long-term operating stresses because present polarity reversal tests do not set limits for partial discharge activity while the oil stresses are highest. Several members feel that a combined ac + dc test at elevated temperature would be a more realistic test, although again there is some question regarding partial

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discharge limits. It was noted that such a test has been successfully performed on a single-phase converter transformer recently which demonstrates its feasibility at least for certain transformer designs. Both tests will be discussed at greater length in the next draft.

In addition, the CIGRE working group has a task force investigating the field performance of converter transformers and smoothing reactors. The task force had their second meeting on March 19 and 20 at which they compiled failure records for the equipment. Initial results indicate that the bushings are involved in a disproportionate number of failures.

The next item discussed at our meeting was the scope for our new standard C57.129. At our meeting in Charlotte it was agreed that a standard is needed for dry-type smoothing reactors, and we decided to add them to the draft of the standard we are currently preparing. Since the last meeting several members expressed the opinion that to include oil-filled and dry-type smoothing reactors in a standard along with converter transformers would result in an overly complex standard. At the meeting it was decided to split the present draft into two documents - one for converter transformers and one for both oil-filled and dry-type smoothing reactors. Richard Dudley prepared a draft extending the discussion for oil-filled reactors to include dry-type, and these notes will be incorporated into the smoothing reactor draft.

The remainder of the meeting was devoted to a lively discussion on dielectric tests. While there is general agreement on the types of additional tests required for dc equipment - long term dc applied and polarity reversal - there is considerable variation on the application of these tests. For example, although the long-term dc applied test usually is specified to last one hour, some require the time to start after the dc steady-state voltage distribution is reached (usually 15 to 20 minutes after voltage application), while others require a preconditioning with a reduced level for 30 minutes to one hour prior to the actual test. We agreed to contact the interested parties and ask for copies of their latest specifications or recommendations together with any comments they may have regarding the tests.

Sincerely,

Bill

William Kennedy  
Chairman, HVDC Converter Transformers  
and Smoothing Reactors Subcommittee

## MEETING MINUTES

### DIELECTRIC TESTS SUBCOMMITTEE

March 27, 1990

Denver, CO

#### 1. INTRODUCTION/ATTENDANCE

The Dielectric Tests Subcommittee met at 10:05 A.M. with 38 members and 43 guests in attendance. Mike Altman, Ron Chatterji and Tito Massouda have been accepted as new members of the Dielectric Tests Subcommittee.

#### 2. APPROVAL OF MINUTES

The minutes of the October 31, 1989 meeting in Charlotte, NC were approved as submitted.

#### 3. CHAIRMAN'S COMMENTS from ADMINISTRATIVE SUBCOMMITTEE

The new Transformers Committee Operating Manual is nearing completion.

Please help our meeting hosts - register early, pre-register.

#### 4. WORKING GROUP REPORTS

##### A. Working Group on Revision of Dielectric Tests

H. R. Moore

The Working Group met on March 26, 1990 with 21 members and 12 guests present. Five new members were added to the Working Group.

The minutes of the October 30, 1989 meeting were approved as written.

The Task Force reports were as follows.

##### 1) Task Force on Revision of Impulse Test Guide

R. E. Minkwitz

The Task Force met at 10:05 A.M. on March 26, 1990 with 24 members and 17 guests present. The minutes of the previous meeting were approved as presented.

##### a. Review of Draft 1 of the Switching Surge Test Document.

Draft 1 of this document had been prepared from comments made on a preliminary paper prepared on this subject. Discussion on the draft resulted in the following decisions:

1. R. E. Minkwitz will add references to the bibliography.

2. A number of detailed changes will be made in the document as a result of the in depth review made. Most of them involved clarifications. It was decided that the use of current oscil-

lograms as low acceptance criteria will not appear in the document. A general standard on the use of current oscillograms will be included in the foreword.

3. The question of incorporating the switching impulse information into ANSI C57.98 was discussed. The consensus was that the information should be integrated into C57.98. However, it was also agreed that it should be issued as a supplementary document if including it in the impulse guide prevented it from being issued in a reasonable period of time. This matter will be given more consideration in the Working Group meeting.

b. Impulse Testing of Low Impedance Windings.

Harold Moore presented the results of the investigation made on this matter. It appears that some detailed revisions in this part of the guide were being considered during the last revision of C57.98. However, it was inadvertently eliminated from the current guide. It was decided that the previous information should be added to the present impulse guide after making some minor clarifications. The Working Group agreed with this proposal.

c. Digital Recording During Production Impulse Tests

It was decided that action on this subject should be taken at the Working Group meeting. There are some problems involved on IEEE ANSI Standard 1122 primarily dealing with equipment. It was decided at the Working Group meeting that the Task Force would prepare a section on the use of digital recording. It will be written along the lines of the present recording information and will not address equipment issues. A group within the Task Force will be asked to prepare this information so that it can be included with the switching surge guide and be balloted before the next meeting of the Working Group.

2) Task Force on Revision of Dielectric Tests  
of Shunt Reactors  
W. N. Kennedy

The Task Force met at 1:00 P.M. on March 26, 1990.

The final draft of ANSI/IEEE C57.21 was again balloted in the Transformers Committee by submitting a statement on the one negative ballot along with the draft. This draft was successfully balloted although the one negative ballot still remains. The document will now be submitted to the Standards Board along with the explanation of efforts made to resolve the one negative ballot. The work of this Task Force has now been completed.

The Working Group expressed their appreciation to Bill and his Task Force for their good efforts on this document.

3) Task Force on Enhancement Voltage Time Duration During  
Power Transformer Induced Tests  
M. Altman

The Task Force met at 8:00 A.M. with 8 members and 8 guests present.

The following items were reviewed:

The PAR for this project was submitted and is in the process of being approved.

The revision of the enhanced voltage time and the criteria to be used were discussed. The results of this discussion were as follows:

The enhancement voltage time should be reduced to 1500 cycles minimum rather than a specified number of seconds.

The magnitude of the partial discharges should be measured at appropriate terminals as a part of the manufacturers quality control procedure but should not be guaranteed. This will extend the test time particularly on three phase autos where six terminals could be involved.

The base measurement should be taken at the 150% value prior to the enhancement.

The level at any time during the one hour at 150% voltage after the enhancement shall not exceed the base value taken prior to the enhancement by more than 30 microvolts. The 30 microvolt variation is in the present standard.

The amount of time allowed for the partial discharge readings to settle down after the enhancement will be studied in the coming months and will be discussed at the next Task Force meeting.

This information was presented to the Working Group. There was agreement with the basic plan as presented, but the Task Force was asked to give more consideration to the following:

Some persons do not believe that the 30 microvolt tolerance is adequate if the base measurement is taken before the enhancement voltage.

The time to make readings on six terminals of an autotransformer mat approach the present 7200 cycles. The Task Force should consider whether the recommendation is for all terminals to be read during the enhancement, high voltage only, or leave it entirely up to the manufacturer.

#### OTHER BUSINESS

##### Impulse Testing of Neutral Terminals

The Working Group agreed that the following statement should be added to the impulse test guide:

"Neutral terminals rated 110 and 150 kV BIL will not be impulse tested unless such tests are specified by the user on specific orders. Neutral terminals rated 200 kV BIL and above will be impulse tested in accordance with ANSI/IEEE C57.12.90-1980 paragraph 10.3.3."

##### Impulse Testing of Terminals Brought Out from Buried Tertiaries

The Working Group agreed that the following statement should be added to the impulse guide:



"Terminals brought to a single bushing from a buried tertiary are for grounding. In some instances the corners of the buried delta will be connected to two bushings for opening of the delta during factory tests. In both situations the bushings are to be directly grounded to the tank in service such that no impulse tests are required on such terminals."

Balloting of Draft 2, Switching Surge Test Guide

The Working Group decided that the switching surge test information should be added to the impulse test guide C57.98. This will require some minor changes in the present wording, etc. It was further agreed that Draft 2 of the Switching Surge Test Guide should be balloted in the Working Group and the Dielectric Tests Subcommittee prior to the next Working Group meeting.

There was some discussion on the need for expanding the information on phase-to-phase switching surge tests in the draft. A previous Task Force had completed the work on bushing spacing that are to be used so that adequate phase-to-phase clearances will be used. This information has been submitted and will be included in the next revision of the guide. It was then agreed that the draft will only contain a statement that phase-to-phase tests are complex requiring two generators and will only be made when specified by the customer.

After the Switching Surge Test Guide has been approved by the Subcommittee, the complete impulse test guide C57.98 will be revised to include all of the proposed changes and submitted for balloting.

The meeting was adjourned at 4:50 P.M.

B. Working Group for Revision of Dielectric Testing of Distribution Transformers

John Rossetti

The Working Group met at 1:00 P.M. on March 26, 1990 in Denver, CO with 13 members and 15 guests present.

The minutes of the October 30, 1989 meeting in Charlotte, NC were approved as written.

J. Ed Smith, Central Moloney, Stephen D. Smith and Philip J. Hopkinson, Cooper Power, were added as members of the Working Group.

1) C57.12.90 c/D6 Routine Impulse Test for Distribution Transformers

Bill Henning reported on the Transformers Committee balloting of C57.12.90 c/D6. There was one negative ballot. Eighty percent of the ballots were returned with 98.8% approval. The negative ballot was based on:

10.4.7.3 The allowance of the impulse test after low frequency dielectric tests is not acceptable.

10.4.2.1 The proposed addition does not provide adequate detail to  
 10.4.2.2 assure high volume routine impulse testing can be done on  
 10.4.2.3 distribution transformers in a consistent manner to produce results that will improve product quality.

General: What about impulse to low-voltage?

The Working Group response was:

The order of dielectric tests specified in C57.12.90 section 10 stated that an impulse test shall be performed prior to the low frequency test. This was done to insure that the low frequency test would find an impulse failure.

The Working Group addressed the detection criteria by requiring that a single turn staged fault be detectable.

The impulse guide will address the methodology needed to perform and assure high volume routine impulse testing.

The need for low voltage impulse testing is being researched by the Task Force on Low Side Surge Requirements for Distribution Transformers.

Bill will attempt to resolve the negative ballot based on the above recommendation given by the Working Group.

2) Task Force on Low Side Surge Requirements for  
Distribution Transformers

R. E. Lee

The Task Force met at 8:15 A.M. on March 26, 1990 with 15 members and 11 guests present in Denver, CO.

The minutes of the October 30 and 31, 1989 meetings in Charlotte, NC were approved as submitted.

Gary Goedde presented and discussed information gathered during the final Cooper Power Systems research. As described in the minutes of the Chicago meeting, Spring 1989, the laboratory work recorded voltages, currents and their waveshapes at many locations on a mock up transformer/service/service entrance/house wiring/house load/both ends grounded. The mock up tested 10 and 15 kVA transformers of both interlaced and non-interlaced design. Balanced and unbalanced secondary fault currents were achieved.

Goals of the Cooper Power Systems research were:

Could unbalanced currents sufficient to fail both designs be achieved? Yes.

Can a protection scheme be designed to protect both designs?

At present, secondary arresters may alleviate, but redistribute the problem.

After discussion, the Task Force agreed that a single test will not fully test a transformer for the wide range of possible circuit variations resulting from the multitude of field configurations.

The Task Force will sponsor a Panel Session on Low Side Surge Requirements for Distribution Transformers at the September 1991 T&D Exposition in Dallas. A schedule was established to write and submit a Task Force Report for review and presentation during the Panel Session. Jeewan Puri, Phil Hopkinson, and Mahesh Sampat will write the document based on the several position paper draft. Cal Kappeler, Charlie Williams, Dave Smith, Bob Lee, and Bruce Uhl will review and edit the paper. It will be completed for Task Force review prior to the Fall meeting in Montreal.

The meeting adjourned at 11:50 A.M.

3) Routine Test Guide for Distribution Transformers, C57.98  
Jeewan Puri

Work completed in 1983 was reviewed as a basis for this activity.

This guide will cover requirements for routine impulse tests for distribution transformers. An initial draft will be prepared for the Montreal meeting.

The Working Group adjourned at 2:50 P.M.

C. Working Group on Partial Discharge Tests for Transformers  
G. H. Vaillancourt

The Working Group met on March 27, 1990 with 20 members and 24 guests present. Three new members, J. Crouse, D. Ballard, and J. B. Templeton were accepted into the Working Group.

The minutes of the Charlotte meeting were accepted as written.

1) Task Force on Acoustic Location of Partial Discharge  
E. Howells

The Task Force met at 8:10 A.M. on March 26, 1990 with 6 members and 16 guests present.

The minutes of the Charlotte meeting were approved as read.

The Chairman reported that the two negative Transformers Committee ballots on the "Detection Guide" had been resolved. Other editorial changes were made to address comments. It has now been sent to the Standards Committee.

Relative to the present work on "Location Guide", details of the "wave guide" technique were not received. Consequently only the theory section has been compiled. After discussion some changes were made.

The Task Force adjourned at 11:15 A.M.

2) Task Force for Measurement of Apparent Charge  
W. J. Carter

The Task Force met at 8:00 A.M. on arch 26, 1990 with 8 members and 5 guests present. Mark Perkins was admitted to membership in the Task Force.

The minutes of the Charlotte meeting were approved without modification.

George Vaillancourt presented analysis of test data which is consistent with previous data. About 10 sets of data have been received.

Discussion covered reading intervals and the problems encountered in the interpretation of meter reading techniques and problems encountered in obtaining proper measurements.

It was suggested that the practical procedure was to average the meter readings during a few seconds at the end of each recording interval. An alternative method would be to use a continuously recording instrument. Neither method is foolproof.

The Transformers Committee ballot of the Trial Use Guide resulted in 91 out of 110 ballots returned, 76 affirmative, 13 abstentions and 2 negative votes. A fundamental problem surfaced by one negative ballot indicates a variability of equipment and the specific rather restrictive requirements for detector characteristics.

The Task Force adjourned at 9:40 A.M.

The Working Group Chairman, after discussion with the negative voter coupled with personal experience at the IREQ test lab, has concluded that the Trial Use Guide C57.113 "Trial Use Guide for Partial Discharge MEasurement in Liquid Filled Power Transformers and Shunt Reactors" needs further refinement principally in the charge meter characteristics. The document will be withdrawn from RevCom review and continue as a trial-use guide. After refinement, the guide will be balloted at the Working Group, Subcommittee and Committee levels as a guide.

The Working Group adjourned at 9:05 A.M.

The Subcommittee agenda item dealing with clarification of dielectric test standards was reported in the Working Group for Revision of Dielectric Tests.

5. NEW BUSINESS

None

6. ADJOURNMENT

The Subcommittee meeting adjourned at 10:59 AM.

*Robert E. Lee*

Robert E. Lee  
Chairman

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IEEE PES TRANSFORMERS COMMITTEE  
DRY TYPE TRANSFORMER SUBCOMMITTEE

MEETING MINUTES

DENVER, CO - March 27, 1990

Chairman: Mr. R. E. Uptegraff, Jr.

1. Chairmans Remarks and Announcements

The Dry Type Transformer Subcommittee met at 1:50 PM on 03/27/90, with 19 members and 9 guests present. Following the introductions of those present a motion was made to approve the minutes of the 10/31/89 meeting (Charlotte, NC). The minutes were approved as written.

- 1.1 The next order of business was the presentation of the reports by the various working groups and task forces. See the following sections for their individual reports.

Sec.2	Dry Type Reactors	Mr. R. Dudley
Sec.3	Thermal Problems	Mr. W. Mutschler
Sec.4	Specialty Transformers	Mr. M. Cambre
Sec.5	Test Code Revision	Mr. E. Koenig
Sec.6	Dielectric Problems	Mr. D. Kline
Sec.7	Thermal Evaluation	Mr. R. Provost

- 1.2 During Mr. Dudley's presentation on dry type reactors there was considerable discussion concerning the approach to be taken in providing a project authorization request (PAR) for the Reactor WG to proceed with revising the current limiting reactor standard. The Chairman noted that most current limiting reactors used in utility systems are of the dry type. Indeed, the Chairman expressed the difficulty one would encounter in finding a supplier of a liquid-filled current limiting reactor.

It was felt that it might be best to develop a dry type standard independent of the liquid-filled reactor standard for the current limiting reactors. In light of the comments made, the Chairman indicated that consideration would be given to request a PAR for a standard identified as PC57.16.1 entitled "Requirements, Terminology, and Test Code for Dry Type Current Limiting Reactors".

- 1.3 Following Mr. Mutschler's presentation, he noted that a number of questions were raised by the decision to continue with 30°C hot spot for the immediate future. Mr. Mutschler explained that in the current issue of C57.12.01-1989 a footnote to Table 4 allows the manufacturer to use a lower number provided the manufacturer can present data to substantiate it.

- 1.4 After Mr. Cambre's presentation, the Chairman briefly discussed bibliographies and references used in standards. He noted that "references" are required to be mentioned in the body of the standard while bibliography entries need not be. He noted that this should be checked in the work being done on the Test Code, C57.12.91.
- 1.5 Mr. Koenig noted that at the conclusion of the Test Code WG meeting it was pointed out that all task forces would have completed their work in the near future, including comments made during the March, 1990 meeting. Based on this information it was agreed that the task force chairmen should ballot their work in the Test Code WG and the Dry Type Subcommittee simultaneously.

Following clarifying comments by the Chairman, Mr. Uptegraff, it was decided the Subcommittee Secretary would prepare a list of individuals for each task force chairman to send ballots. The list would consist of a unique listing of the task force, Test Code WG, and Dry Type Subcommittee members to be balloted by the task force and is intended to reduce duplication of ballots being sent to individuals.

- 1.6 During Mr. Kline's report of the Dielectric Problems WG the Chairman reported that IEEE now offers a service of performing the balloting process of the Transformer Committee. They will provide a list of the members, send the ballots, and perform any required follow-up service on non-returned ballots. At this point, the Chairman did not have the details on how to obtain this service and would report them at a future meeting.
- 1.7 At the conclusion of all the working group presentations, the Chairman briefly reported on a number of items.
- 1.7.1 There is a new IEEE Transformer Committee Operating Manual in process and should be in use before the next meeting.
- 1.7.2 As noted earlier, IEEE will offer a service to conduct balloting of the Transformer Committee. Details on how to obtain this service will be forthcoming.
- 1.7.3 There is a new Project Authorization Request (PAR) form. If the old forms are used, IEEE will return them. The Chairman will forward copies of the new form to WG chairmen as soon as they become available.
- 1.7.4 The Chairman reported on the current status of a number of standards.

C57.12.01 has been published - as an IEEE document. It has not been through the ANSI process as yet.

C57.12.50, C57.12.51, and C57.12.52 have been republished. These are the application guides, all of which were NEMA sponsored.

C57.12.55, the conformance standard, is approved.

C57.12.56 and C57.12.57 are also available.

C57.12.58, the long delayed "Guide to Conducting Transient Analysis of Dry Type Transformer Windings", is expected to be submitted to the Standards Board before the next meeting in Montreal.

C57.12.59, the through fault current duration guide, was published.

C57.12.60, "Guide for Thermal Evaluation of Insulation Systems for Cast Coils", has been approved for trial use.

C57.12.91, the dry type test code, is currently undergoing revision.

C57.12.94, the "Recommended Practices for Installation, Maintenance, and Operation of Dry Type Transformers", was recently reaffirmed.

C57.12.96, the loading guide, has been published.

C57.124, the guide for conducting partial discharge test, is ready for balloting of the Transformers Committee.

1.7.5 The Chairman reported that a new IEEE Power Engineering Society Organization and Committee Directory has been published.

1.8 There being no further business, the meeting was adjourned at 3:10 PM.



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## 2. Working Group on Dry Type Reactors

Chairman: Mr. Richard Dudley

Ref: C57.21 - "Requirements for Shunt Reactors"  
C57.16 - "Requirements for Current Limiting Reactors"

This WG participates as a task force in the activities of the WG on Shunt Reactors chaired by Mr. J. McGill. The WG provides recommendations relating to dry type reactors as distinguished from liquid-filled reactors. Work on C57.21 is essentially complete. The WG is currently undertaking revisions to C57.16.

- 2.1 The task force met on March 26, 1990 at 10:05 AM with 6 members and 6 guests present. Following the introductions of those present, the minutes of the 10/30/89 meeting were approved as written.
- 2.2 There were no outstanding issues on the revision of C57.21. Current balloting of the Transformers Committee was reported as positive and no more input from the Dry Type Reactor WG was requested.
- 2.3 The work of Mr. W. Kennedy's WG on "General Requirements and Test Code for Oil-Immersed Converter Transformers and Smoothing Reactors for D.C. Power Transmission" was discussed. The WG supported the consensus expressed in Mr. Kennedy's meeting of 03/26/90 that there should be two documents; one for converter transformers and one for oil-immersed iron core and dry type air core smoothing reactors. It was also agreed that the Dry Type Reactor WG should handle the dry type air core smoothing reactor portion and feed Mr. Kennedy's main working group in a similar fashion as was done for the revision of C57.21.
- 2.4 The remainder of the meeting was devoted to the revision of C57.16. The key subjects covered were:
  - 2.4.1 Work on this document should proceed on the basis of the Dry Type Reactor WG being responsible for the dry type portion and then submitting it's input to a main WG responsible for the overall revision of the standard; i.e. oil-immersed and dry type.

At a later meeting of Mr. J. McGill's WG on the revision of C57.21 it was suggested that the revision of C57.16 only deal with dry types as there appears to be little or no manufacture of oil-immersed units today. A letter survey of manufacturers could resolve the issue. Mr. Dudley agreed to organize such a survey.

- 2.4.2 Mr. Dudley's submission of temperature rise limits was discussed. It was agreed that, since "current limiting reactors" are load cycled, higher limits than those in C57.21 (revision) could be allowed. However, it was decided that "notes" should be added to the table cautioning the manufacturer and end user on the effects of continuous long term operation versus load cycling and that if overloading is required, it should be specified.

There was a consensus to add an appendix which would be a tutorial on overloading. This would probably take the place of an overload guide; since, with the variety of insulation systems, design approaches, and loss evaluation levels available in modern dry type reactors, a detailed (overload formulas) guide is not practical. By including overload information in the standard it will force utility operations people to use the same document as equipment engineers and thus avoid possible problems.

A good definition of overloading was suggested. To wit:

"Overloading is defined as loading beyond nameplate but within the physical limits of the design or the past history of the equipment."

- 2.4.3 Definitions, possibly including circuit diagrams, of the various types of reactors covered by C57.16 should be included in the main text. Reactors covered will be distribution class current limiting reactors, high voltage series reactors, and capacitor switching reactors. Reactors for neutral grounding and reactors used in series H.V. capacitor banks are already covered by other standards. Filter reactors will not be covered. Filter reactors are essentially part of the overall specification of a filter. It is not clear where they should be covered.
- 2.4.4 For H.V. series reactors and H.V. capacitor switching reactors seismic withstand capability can be important. Seismic criteria will not be covered in detail in the revision of C57.16. Other appropriate standards and national building codes will be referenced.
- 2.4.5 The voltage class of reactors covered by the revision of C57.16 will be up to and including 765 KV. Dry type capacitor switching reactors have been installed at 500 KV and H.V. dry type air core series reactors have been regularly used at 235 KV.
- 2.5 The meeting was adjourned at 11:40 AM.

3. Working Group on Dry Type Thermal Problems

Chairman: Mr. William Mutschler

This WG is undertaking the review of various temperature related issues involved in loading, overloading, and aging of dry type transformers. The two main issues currently being investigated are: hot spot allowances and thermal time constants.

- 3.1 The working group met at 8:00 AM on 03/27/90 with 17 members and 10 guests present. Following the introductions of those present, the minutes of the 10/30/89 meeting were approved.
- 3.2 The first order of business was discussion of the 30°C hot spot allowance used in the present loading guide. A review of IEC 905, Loading Guide for Dry Type Transformers, was made which indicated that the allowance varied for each of the various temperature classifications. After considerable discussion a motion was carried to leave the allowance of 30°C; since lower values were conditionally available based on Table 4A of C57.12.01-1989. This motion was made with the understanding that the next revision of C57.96-1989 would have an extensive dissertation on hottest spot allowances.
- 3.3 The next item of business was the status of time constant data. Mr. E. Koenig reported that he had received time constant data from four manufacturers which he will pass on to the Chairman for dissemination and discussion at the next meeting.
- 3.4 The final item of discussion was consideration of the need for information to be included in the loading guide for cast resin transformers. The Chairman asked for volunteers to serve on a task force to develop this information. Messrs. Bancroft, Haas, Goethals, Pierce, and Theneppan volunteered and Mr. Pierce agreed to serve as chairman.
- 3.5 The meeting was adjourned at 9:35 AM.

4. Working Group on Specialty Transformers - P259

Chairman: Mr. Max Cambre

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

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

- 4.1 The working Group met at 1:00 Pm on 03/26/90 with 7 members and 3 guests present. Following the introductions of those present and approval of the minutes of the 10/30/89 meeting, Draft #5 of P259 was distributed. The remainder of the meeting focused on discussions related to this draft.
- 4.2 The requirement for a tolerance of no more than  $\pm 2.0\%$  temperature differential at any point in an aging oven was discussed. Appropriate IEEE standards will be checked for reference.
- 4.3 Cold shock in Table 2 is  $-20^{\circ}\text{C}$ . The WG discussed lowering this to  $-30^{\circ}\text{C}$ . This point will be checked in other standards for coordination.
- 4.4 A request was made for an expanded bibliography. Mr. M. Manning will submit information from his extensive files and Mr. R. Provost will check the Insulation Society for appropriate references.
- 4.5 The Chairman agreed to reformat Draft #5 with appropriate changes (mainly using two column format) and to ballot the WG before the next meeting.
- 4.6 The meeting was adjourned at 2:10 PM.

5. Working Group on Test Code C57.12.91/PC57.12.91

Chairman: Mr. Egon Koenig

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

This working group has the mission of revision/reaffirmation of the Dry Type Transformer Test Code - C57.12.91.

- 5.1 The working group met at 10:10 AM on 03/26/90 with 21 members and 7 guests present. Three of the guests requested membership on the working group and were accepted. The new members are:

Mr. Michael Mittelman	General Electric
Mr. Wes Schwartz	Square D
Mr. Richard Provost	Dupont

- 5.2 Following the introduction of those present, the minutes of the 10/30/89 meeting were approved without modification.
- 5.3 The Chairman reported that ANSI/IEEE C57.12.01, General Requirements for Dry Type Transformers Including those with Solid Resin and/or Resin Encapsulated Windings, was issued.
- 5.4 The next order of business was the reports from the six task force chairmen on their progress on reviewing and recommending changes to C57.12.91. Each task force met the previous day (Sunday - 03/25/90). A summary of their individual reports follows.
- 5.4.1 Foreword and Chapters 1,2,3,4 - Mr. R. Uptegraff
- Mr. Uptegraff reported that the review of these sections was completed and they are ready for balloting.
- 5.4.2 Chapters 5,6,7,8,9 - Mr. R. Hollister
- Mr. Hollister reported that except for Figure 20 and a proposed Figure 5, these chapters are ready to ballot. A complete draft of these chapters will be prepared for comments prior to the next meeting.
- 5.4.3 Chapter 10 - Mr. J. Rodden
- Mr. Rodden reported that this chapter will be ready for balloting before the next meeting after a few editorial changes.

5.4.4 Chapter 11 - Mr. L. Pierce

Mr. Pierce reported that the temperature rise tests have had a complete rewrite. The task force is addressing the issue of averaging the temperature rise results of each winding, primary and secondary. Also under review are the correction factors for test current which differs from rated current. By June, 1990 he expects the task force will issue a draft of the revised Chapter 11.

5.4.5 Chapter 12 - Mr. W. Mutschler

Mr. Mutschler reported that, by the next meeting, his task force intends to add an appendix to the short circuit test code similar to Part 2 of C57.12.90 which will be tailored to dry type transformers. Mr. Mutschler also recommends dropping the low voltage impulse test requirement presently included in C57.12.91.

5.4.6 Chapters 13,14,15 - Mr. M. Cambre

Mr. Cambre reported that the formula which approximates regulation in Chapter 15 is not the same as a similar formula in NEMA ST-20. However, the formula is the same as that shown in C57.12.90. Mr. M. Manning was asked to study the situation and report his findings at the next meeting.

5.5 Following the reports by the task force chairmen, Mr. Koenig opened the floor to discussion of new business.

5.5.1 Mr. B. Allen reported to the WG that the scope of a guide on Loss Tolerance and Measurement has been revised to include dry type transformers.

5.5.2 Mr. A. Jonnatti brought to the WG's attention that the newly released C57.12.01 requires higher frequency test levels for dry type transformers than for liquid-immersed transformers when the BIL is 110 KV. During the discussion it was pointed out that 25 KV class dry type transformers often carry 110 KV BIL where as liquid-immersed units are usually rated 15 KV class at 125 KV BIL.

5.6 The Chairman requested that each task force chairman submit drafts for approval in final type written form complete with margin notes to highlight areas changed from the existing standard. These drafts are to be submitted to the Chairman by July 15, 1990.

5.7 The Chairman requested that minutes from the Sunday task force meetings be submitted the WG Secretary, Mr. D. Barnard, before leaving Denver.

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- 5.8 The Chairman requested that each WG member/guest review Chapter 14 on Mechanical Tests. The Chapter was omitted from C57.12.90. It has been proposed that it be dropped from C57.12.91 also.
- 5.9 The meeting was adjourned at 12:10 PM.

6. Working Group on Dry Type Dielectric Problems

Chairman: Mr. Don Kline

Ref: PC57.124 - Recommended Practice for the Detection of Partial Discharges and the Measurement of Apparent Charge in Dry Type Transformers

The mission of this working group is the development of C57.124 which is presently in Draft #7.

6.1 The working group met at 3:05 PM on 03/26/90 with 17 members and 8 guests present. Following the introductions and approval of the minutes from the 10/30/89 meeting; the Chairman distributed copies of Draft #7 of PC57.124.

6.2 The Chairman reported of the WG balloting of Draft #7. The results were:

Approved:..... 8  
Approved with Comment:..... 9  
Not Voting:..... 1

6.2 The remainder of the meeting focused on editorial comments to Draft #7. The editorial changes offered during the balloting were discussed individually. Additional editorial changes were offered. No major changes were suggested.

6.3 The Chairman agreed to incorporate the editorial changes in Draft #8. This draft will then be submitted to the Transformer Committee for balloting after the expiration date for Draft #7 has passed.

6.4 The meeting was adjourned at 3:50 PM.



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## 7. Working Group on Thermal Evaluation

Chairman: Mr. Richard Provost

Ref: C57.12.60 - Standard Test Procedures for Thermal Evaluation of Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers

This working group has been charged with developing C57.12.60. The work on this standard has been mostly completed and the standard was submitted for trial use. Trial use was employed due to the WG being unable to define an existing insulation system to use as a control for comparison with an insulation system under test.

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

7.1 The working group met at 11:15 AM on 03/27/90 with 12 members and 10 guests present. Following the introductions of those present, the minutes of the 10/31/89 meeting were approved as written. Copies of the current WG membership roster were circulated for corrections or additions.

7.2 The Chairman observed that the primary function of this WG was completed and that the standard, C57.12.60, was now ready for submittal to the Standards Board. All balloting in the Transformer Committee and endorsement by coordinating agencies had been completed.

The Chairman noted that C57.12.60 would require reaffirmation in two years. He passed out a questionnaire requesting any manufacturer who might be willing to provide data related to C57.12.60 to an impartial party. It is hoped that data to support the standard can be obtained before the reaffirmation deadline. Mr. Uptegraff noted that trial use standards could be re-issued after two years - again as trial use.

7.3 The Chairman then reported on flammability issues. He noted that the French utility, EDF - Electricity de France, has issued a dry type transformer standard related to flammability and toxicity. The Chairman also noted that the Germans were working on a similar standard. The Chairman offered to obtain copies of the EDF document for the next meeting and provide the standard number and address for procurement by the WG members.

7.4 The meeting was adjourned at 11:45 AM.

8. Attendance Roster

MEMBERS PRESENT

B. Allen  
R. Bancroft  
D. Barnard  
M. Cambre  
R. Dudley  
R. Gearhart  
A. Jonnatti  
D. Kline  
E. Koenig  
M. Manning  
R. Marek  
W. Mutschler  
W. Patterson  
P. Payne  
R. Provost  
J. Rodden  
V. Theneppan  
R. Uptegraff  
H. Windisch

MEMBERS ABSENT

A. Bimbiris  
T. Darr  
J. Frank  
H. Gabel  
G. Gaibrois  
S. Kennedy  
J. Nay

GUESTS PRESENT

T. Bowers  
M. Haas  
R. Hayes  
N. Meyer  
K. Papp  
G. Pregent  
R. Richardson  
R. Simpson  
W. Schwartz

ATTENDANCE SUMMARY

	Present	Absent
Members	19	7
Guests	9	

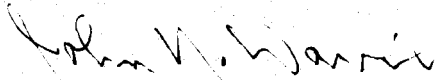
Prepared By: Wesley F. Patterson Jr.  
Secretary  
Dry Type Transformer Subcommittee  
July 24, 1990

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IEEE/PES  
Instrument Transformer Sub-committee  
Denver, Col.  
Mar. 28, 1990

1. The Instrument Transformer Sub-committee met Mar. 27, 1990. Six members and five guests attended.
2. Tables 2 and 3 (for P546/D7) for insulation levels and dielectric tests were approved. With minor editorial changes, P546/D7 is now complete.
3. Industry trends were discussed. The effect of harmonics on accuracy is not clear. John Ramboz, N.I.S.&T., is collecting data for the sub-committee. The new smart electronic meters (and relays) for revenue metering may require new burden definitions and secondary current and voltage ratings. Fiber optic technology was also discussed.
4. Joe Ma will lead a study group which will identify the similarities and significant differences between IEEE/ANSI, IEC, and Canadian standards for instrument transformers. The purpose of the group is to prepare IEEE for the next revision of ANSI/IEEE C57.13, "Standard Requirements for Instrument Transformers" in five years.
5. There being no further old business nor any new business, the meeting was adjourned at 12:10 PM.

Respectively submitted,



John N. Davis, Chairman

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MINUTES OF  
INSULATING FLUIDS SUBCOMMITTEE

March 26-27, 1990  
Denver, Colorado

The Subcommittee met on Monday and Tuesday, March 26-27, 1990. There were 26 members and 7 guests present.

The minutes of the previous meeting in Charlotte were approved as written.

MEMBERS PRESENT:

D. J. Allans	R. I. Lowe
J. Corkran	C. K. Miller
D. H. Douglas	R. E. Minkwitz
M. Frydman	R. J. Musil
J. P. Gibeault	W. H. Mutschler
D. A. Gillies	H. A. Pearce
F. J. Gryszkiewicz	G. J. Reitter
F. W. Heinrichs	L. J. Savio
C. R. Hoesel	D. W. Sundin
D. L. Johnson	T. P. Traub
J. J. Kelly	L. Wagenaar
J. P. Kinney	F. N. Young
J. G. Lackey	D. W. Crofts/D. W. Rose

GUESTS PRESENT:

B. Beater	C. Kamlanik
O. Chew	S. Moore
O. W. Iwanusin	D. R. Schafer
R. P. Johnston	

Three projects are presently being handled by the Subcommittee. They are as follows:

PROJECT C57.104 - REVISION OF GAS GUIDE:

Revisions and comments for resolution of negative ballots were incorporated into Draft 9 which was reviewed by the Subcommittee.

Draft 10 will be prepared by working group and balloted by Subcommittee in May 1990, and by the Transformers Committee before the 1990 Fall Meeting in Montreal.

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PROJECT C57.106 - REVISION OF OIL GUIDE:

The Subcommittee reviewed Draft 4 in its entirety. Draft 5 will be prepared for Subcommittee Ballot in May 1990. A Transformers Committee Ballot is planned for August 1990, prior to the Fall Meeting in Montreal.

PROJECT C57.130 - GAS ANALYSIS DURING FACTORY TEST:

The working group discussed assignments. Draft 1 will be prepared for discussion by Subcommittee at the Fall 1990 Meeting in Montreal.

WORKING GROUP PC57.130 ON GAS ANALYSIS DURING FACTORY TEST

Working Group PC57.130 met on March 26 at the Denver Marriott with 11 members and 25 guests present. Three new members joined the Working Group:


Frank David	Federal Pioneer Ltd.
Jean Pierre Gibeault	Syprotec Inc.
Dennis J. Allen	GEC Alsthom Transformers Ltd.

Preliminary drafts of sections of the Guide were reviewed and edited. The first draft will be balloted in the Working Group prior to the next meeting in Montreal.

Membership is now 17 since Frank David replaced Dennis Marlow on the Working Group.

Members are: A. Delgado, D. H. Douglas, J. A. Ebert, M. Frydman, R. L. Grubb, F. J. Gyszkiewicz, F. W. Heinrichs, J. J. Kelly, J. P. Kinney, J. G. Lackey, D. Marlow, R. J. Musil, H. A. Pearce, L. J. Savio and R. A. Veitch

s/J. P. Kinney, Chairman  
Working Group on PC57.130

  
H. A. Pearce  
Chairman

F. W. Heinrichs  
Secretary

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Meeting Minutes  
Insulation Life Subcommittee  
of the  
IEEE Transformer Committee  
at the  
Marriott City Center Hotel  
Denver, Colorado  
March 27, 1990

The Insulation Life Subcommittee met on Tuesday, March 27, at 2:10 p.m. with 24 members and 47 guests making a total attendance of 71.

The minutes of the fall meeting in Charlotte, North Carolina, were approved as issued.

The Chairman introduced and welcomed four new members to the Subcommittee.

Vince Dunhinden - H. Weidmann, Switzerland  
Stan Lindgren - ERPI, Palo Alto  
Tito Massuda - Maloney Electric, Toronto, Canada  
Don Platts - Penn P&L, Allentown

Several pertinent items from the Administration Subcommittee meeting were presented.

1. There is a new blue form for PAR application, don't use old form.
2. The new 1990 C57 Edition is published and available for about \$55.00 to members.

The first Working Group report was given by Bill Wrenn, Chairman of the Working Group on Guides for Loading. Bill reported that his Working Group met on Monday, March 26, at 8:00 a.m. with 27 members and 20 guests in attendance.

John Matthews presented a still very preliminary Draft 5 of the total document which is a combining of the two loading guides for power transformers and the one for distribution transformers.

Bill McNutt presented an expansion of his proposal at the Charlotte meeting of using a per unit life versus hottest spot temperature curve instead of the present curve in the guide of Life Expectancy in hours versus hottest spot temperature. His proposal expansion introduced several alternates for more liberal values of one per unit at 110°C, as determined by insulation system tests, such as 20 percent tensile strength and a degree of polymerization of 150°. A formula was included in this proposal to calculate an aging acceleration factor, which is similar to that used in the IEC loading guide.

Dave Douglas then made a proposal to use the per unit curve for both power and distribution transformers with the slope of the per unit curve being set equal to the more conservative slope for distribution transformers. Also included in this second proposal, was another equation similar to the McNutt equation but including a number of loss of life factors which determine a base for the per unit curve. This equation allows a user to determine the degree of conservatism he would like in his loss of life calculation and to calculate percent loss of life, as he is now accustomed to doing.

Bill McNutt suggested that test tube aging tests result in a shorter life than "in-service" aging, due to the concentration of degradation products trapped in the test tube such as water which speeds up the aging process. In an in-service transformer the water is driven away from the hottest spot locations.

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It was decided that a Task Force be set up to determine the approach to be included in the new guide for loss of life calculations. Dave Douglas was asked to be Chairman of this Task Force which will meet before the fall meeting, tentatively at the summer PES meeting in Minneapolis.

After this Working Group report, the Subcommittee Chairman announced that Bill Wrenn was stepping down as Chairman of the Working Group on Guides for Loading due to retirement. Bill was congratulated for the outstanding job he has done in leading this Working Group. The new Chairman of this Working Group will be Dave Takach of Union Electric, St. Louis.

The second Working Group report was given by Bob Grubb, Chairman of the Working Group on Thermal Tests. He reported that the Group met at 3:05 p.m. on Monday with 12 members and 8 guests in attendance. Three guests, Barry Beaster of Delta Star, Jerry Grimes of ABB and Charles Hosel of Arizona Public Service signed on as new members.

The status of P838, Recommended Procedure for Performing Temperature Rise Tests at Loads Beyond Nameplate Rating, was given. Draft 11 had been sent out for ballot of the entire Transformer Committee on March 4. Six weeks are required for ballot return so all ballots are not in yet. Forty-four ballots total have been returned, including thirty-eight Approved, two Not Approved and four Abstentions. A listing prepared by the Chairman was handed out indicating editorial comments, issues to resolve and negative ballots received. These formed the basis of extensive discussion for a major part of the meeting.

The status of PC57.12.00L, Definition of Thermally Duplicate Transformers, was presented. The Chairman had sent out his write-up of a suggested definition based on previous discussions, as well as a simplified suggestion by Orrean Chew. A meeting was held with several Task Force members on Sunday. The result of that meeting was a combined definition, which was handed out for review at the Working Group meeting. This combined approach defines temperature rise testing for units of 500 kVA as a "design" test for new design units and as an "other" test when specified by the user. There is reference also to omission of the "other" test, when duplicate characteristics are met. The listed criteria include:

- transformer type
- type of cooling fluid
- type of cooling and coolant flow path
- winding types
- no load and load loss tolerances (within 30 percent)
- top oil and average winding rise tolerances ( $\pm 5^{\circ}\text{C}$ )
- winding gradient tolerance (20 percent)

The proposed combined definition prepared by the Task Force will be balloted in the Working Group.

Under Other Old Business, the much needed work to review the thermal test procedures in ANSI C57.12.90 Test Code was discussed. Little can be done in this area until after the overhead guide is completed.

The third Working Group report was given by Larry Lowdermilk, Chairman of the Working Group Group on Thermal Evolution of Distribution and Power Transformers. He reported that this Working Group met at 8:00 a.m. on Tuesday, March 27, 1990. The meeting was attended by 12 members and 32 guests. Orrean Chew and Tito Massuda were added to the Working Group.

Next on the agenda was a discussion of the criteria to be used to demonstrate the life of a new insulation system. Lin Pierce had made a proposal at the last meeting that a statement be added to the test procedure that would state that "The model aging procedure shall demonstrate through extrapolation a life greater than 180,000 hours at rated hot spot temperature of the transformer design being qualified." This motion was defeated after considerable discussion which centered around concerns that this criteria would not provide an adequate safety factor to account for all the variabilities that could be encountered when a new design is put into service.

Lin Pierce had prepared some additional comments regarding the life test criteria for discuss at this meeting. He pointed out a discrepancy between the present Distribution Thermal Evaluation Standard and the Distribution Transformer Loading Guide. He then proposed several changes to be made to the draft to correct these discrepancies. Dave Truax agreed to incorporate these changes into another draft. He also agreed to incorporate the "forward" which Lin submitted earlier and the model assembly guidelines that Dean Yannucci prepared as an appendix. The goal is to have this complete document ready for a Working Group ballot by August 1, 1990.

Bill McNutt elaborated further on his belief that there needs to be (2) levels of thermal evaluation covered by this evaluation guide. One level for material evaluation such as when a new vendor begins supplying insulating materials and another level for functional life test of the complete system. Stan Lindgren agreed to mail EPRI reports which outline a test tube evaluation procedure that might be incorporated to perform a preliminary screening of new materials and thereby avoid the cost of conducting functional life tests on models each time a minor change occurs in the insulation system. Chuck McMillen agreed to review the EPRI test tube evaluation procedure and make a proposal as to how it might also be incorporated into the final document.

OTHER OLD BUSINESS - None

NEW BUSINESS

The Chairman indicated that the document IEEE 756 "Trial Use Guide for Loading Mineral Oil Immersed Power Transformers Rated in Excess of 100 MVA" has now been out since May of 1984. No significant revisions have been received by IEEE headquarters during this time. Therefore, the Chairman has been requested to make a motion at the Main Transformer Committee on Wednesday morning to get approval, by hand vote of Committee members, for permanent status of IEEE 756, removing the words "Trial Use" from the title.

At the end of the Subcommittee meeting, Ed Norton gave a very interesting presentation on a sophisticated heat run on a PG&E transformer equipped with 12 direct reading hot spot sensors located in the windings on the conductor, in insulating spacers and in the oil ducts.

Some of the conclusions drawn from these test results were that

1. The time constant for the oil in the ducts is the same as that for the windings.
2. The oil duct temperature can be higher than the winding hot spot temperature.

There being no further business, the Subcommittee meeting was adjourned at 3:20 p.m.

David H. Douglas  
Subcommittee Chairman

DHD:lms



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March 28, 1990

Performance Characteristics Subcommittee

Meeting Minutes - Denver, CO - March 27, 1990

I. Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 11:15 a.m. on Tuesday, March 27, 1990 with 31 members and 46 guests in attendance.

II. Approval of Minutes

The minutes of the October 31, 1989, PCS Meeting were approved as written.

III. Chairman's Remarks

A. Administrative Subcommittee Notes

The following information, obtained at the March 26, 1990, meeting of the Administrative Subcommittee was presented:

1. The next Committee meeting will be held at The Bonaventure Hotel in Montreal, Canada - October 21-24.
2. The Committee Operating Manual is still pending final revision. The final revised manual should be available at the next meeting.
3. Contact Ms. Sue Vogel, PES Administrator, regarding the following new services:
  - a. Transformer Committee balloting. - See Standards Subcommittee report for details.
  - b. Document Scanning - Complete documents are scanned and returned on magnetic disk in any desired format.
  - c. Document Editing - Documents can be edited for standard format anytime during development.
4. The portion of the Standards Subcommittee Report pertaining to PCS projects is attached for review (Attachment PCS-A). Note in particular the C57.12.00 and C57.12.90 projects which must be completed by Spring, 1992.

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5. The 1990 C57 Combined Edition is now available. It contains twelve new documents and costs \$55 for members, \$110 for non-members.

B. Liaison Reports

1. IEEE Power Systems Relaying Committee,  
Network Transformer Protection Working Group

No oral report was presented. See the attached written report which was received after the last PCS meeting (Attachment PCS-B).

C. Membership

Tito Massouda (Moloney Electric), Chuck Murray (Consultant), and John Wood (PG&E) were added to the PCS roster. John Bergeron, Don Cash and Dean Yannucci were removed from the roster. Membership now stands at 56.

IV. Agenda Changes

Project Report C. Revision C57.12.00K - Table 16 was added.

No other changes were requested.

V. Working Group Reports

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

The Working Group on Loss Tolerances and Measurements met on Monday, March 26, 1990 at 3:05 p.m. with 13 members and 22 guests present. Minutes of the previous meeting were accepted without change.

The next item of business was the report of the Loss Measurement Guide Task Force. At its meeting, the Task Force reviewed its proposal for Section 2 of the guide, "No Load Losses". Members will forward any additional comments to Ramsis Girgis, who will issue an updated version.

Most of the working group meeting was devoted to a review of the ballot that was conducted of the Performance Characteristics Subcommittee regarding load and no load losses. The Working Group needed to address four negative votes. Two of the four negative votes objected to the 20°C reference temperature for no-load losses. The two negative votes proposed an 85°C reference temperature.

After much discussion and a review of the history of this proposal, by verbal note, the Working Group unanimously agreed that the reference temperature for no-load losses should be 20°C. The primary

reason is a concern over the accuracy in the reported results if the temperature at time of test is far different than the reference temperature. The proposed temperature correction method is an empirically-derived approximation, suitable only if the reference temperature is sufficiently close to the test temperature, so that the magnitude of the correction is small, acceptance of the correction method is tied to acceptance of the 20°C reference temperature.

The Working Group believes we should not attempt to resolve this at the Performance Characteristics Subcommittee level because this is sure to come up again at the Main Committee Level. The Working Group would like to conduct a ballot of the main committee and simultaneously re-ballot the Subcommittee.

The Working Group then went on to discuss the two remaining negative votes, which were cast by Working Group members who were present at the meeting. It appears we were able to overcome these objections.

The last item was to distribute a proposal for changes to Section 5 on resistance measurement, prepared by Oli Iwanusiw. This proposal will be discussed at our next meeting.

The Working Group was adjourned at 4:45 p.m.

Following this report, the PCS discussed the procedures for balloting the project PC57.12.90 - Section 8. It was decided that resolution of the two negative PCS ballots must be sought prior to balloting the full Committee. Both PC57.12.90 projects will then be simultaneously balloted in the full Committee.

B. Semi-Conductor Rectifier Transformers - G. C. (Charlie) Pounds

This Working Group did not meet as scheduled due to last minute conflicts for both the Chairman and Secretary.

The PCS Chairman reported that Charlie sent word that Draft 6 of PC57.18.10 should soon be ready to ballot in PCS.

C. Qualification of Transformers for Class 1E Application in Nuclear Power Stations - L. R. (Len) Stensland

The Working Group met yesterday with four members and two guests present. The minutes of the October 30, 1989, meeting were approved as written.

The meeting was devoted to reviewing conditional affirmative and negative ballots to Draft 17 of P638. Several commentators on this draft need to be contacted for clarification of their comments. It is still the consensus of the Working Group members that all conditional affirmative and all but maybe one negative ballot can be resolved by editorial changes or withdrawn without issuing another ballot. If the one negative ballot cannot be resolved, the standard will still be forwarded to the Standards Board and noted as such.

Two of our Working Group members, W. H. Mutschler, Jr. and L. R. Stensland, are retiring next month. This leaves only three active members on the Working Group. I am asking John Matthews to choose a chairman to follow up on the work required to have this standard reach final issuance.

The PCS thanked Len for the many years of hard work as Chairman of this Working Group and wished him good luck in retirement.

Subsequent to this meeting, Linden Pierce graciously accepted the position of Chairman of this Working Group.

D. Test Code for Shunt Reactors (C57.21) - J. W. (Jack) McGill

This Working Group met at 3:05 p.m. on March 26, 1990, at the Marriott City Center Hotel in Denver, Colorado. There were ten (10) persons present; seven (7) members and three (3) guests.

Minutes of the last meeting in Charlotte were approved as written. The results of reballoting the Main Transformers Committee for the changes to Draft #9 are listed below:

Total Ballots Sent Out.....	124
Total Voting Members.....	111

Returned Ballots

Approved.....	80
Approved with Comments.....	0
Not Voting.....	11
Negative.....	0
Total Returns	91
% of returned ballots	82%

NOTE: The previous unresolved negative vote is still unresolved and will be documented and presented to the Standards Board along with the approved Draft #10.

At present there is no need for this Working Group to meet in the future as the approved Draft #10 on the revisions to C57.21 will be forwarded next month to the Standards Board for their approval

I personally want to thank all the members of the Task Forces, Working Group, Subcommittee, and the Main Committee for their input over the last nine (9) years in finally accomplishing our original task.

The meeting was adjourned at 3:30 p.m.

The PCS Chairman thanked Jack for his fine efforts as Chairman of this Working Group.

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

The LTC Performance Requirements Working Group met at 3:05 p.m. on Monday, March 26, 1990, with 14 members and 17 guests in attendance. Introductions were made and the minutes of the previous meeting on Charlotte were approved.

The chairman announced that written permission had been received from the IEC to duplicate portions of IEC Standard 214, which is copyrighted material, in the new standard (PC57.131) being developed by the Working Group.

Previous to the meeting, Draft 3 of PC57.131, Standard Requirements for Load Tap Changers, had been sent to the Working Group members for review and ballot. The basis for Draft 3 were comments that had been received from the Working Group members on previous Draft 2. Eighteen ballots had been sent out and 13 were returned. Of those returned, 6 were approved with comments and 7 as not approved.

The Chairman presented a summary of major comments received with Draft 3. The comments were in the following areas:

- The temperature environment in which an LTC should be suitable for operation for the situation when it is in the main tank or in a separate compartment.
- The number of LTCs that should be tested to constitute or design test.
- Whether limiting temperature rise should be specified at rated current or at 1.2 times rated current.
- Requirements for overload capability.
- The number of operations to be performed for the service duty test.
- The need for performing a sequence test and the need for oscillographs during the mechanical endurance test.
- The type of tests and voltage levels for dielectric tests.
- The need for a partial discharge test and, if performed, the allowable limits.
- Whether the requirements for the motor drive mechanism should be kept in a separate section of the standard or incorporated into the LTC portion of the standard.

The Chairman asked the Working Group members for guidance on how to resolve the many, and often conflicting, comments that were received on Draft 3. Considerable discussion took place on this subject. The major concern expressed was that Draft 3 was deviating too much from IEC 214 and was introducing too many new requirements. The major

comments received with Draft 3 were then reviewed again and it was found that many, but not all, of the objections to Draft 3 could be eliminated if the requirements of IEC 214 were followed more closely.

The Chairman agreed to have Draft 4 prepared and sent out for review and ballot before the next meeting of the Working Group. This draft will consider the comments received with Draft 3, and where there are conflicting opinions on a particular item, the requirements of IEC 214 will take precedence.

The Working Group meeting adjourned at 4:30 p.m.

F. Failure Analysis - D. J. (Don) Cash

The Working Group on Transformer Failure Analysis met at 1:05 p.m. on Monday, March 26, 1990, in the Colorado C Room of the Denver Marriott City Center Hotel. There were 21 members and 21 guests present.

After introductions of members and guests, the minutes of the October 30, 1989, Working Group meeting were approved as submitted.

The Chairman congratulated the Task Force on Failure Analysis, chaired by Wally Binder, for its outstanding work in developing the Guide, PC57.125, to its present form. The Chairman also announced that because of organizational changes, this would be his last meeting and that Wally Binder would succeed him as Chairman of the Working Group.

Following direction given at the October meeting, Draft 8 of PC57.125, Guide for Failure Investigation, Documentation, and Analysis for Power Transformer and Shunt Reactors, was sent to the Performance Characteristics Subcommittee for balloting. The results of this ballot are as follows:

53 ballots sent out - 43 returned (81%)

Of those returned: Approved - 36, Approved w/Comments - 4, Not Approved - 1, Not Voting - 1.

Subsequently, the one negative ballot was resolved with its author.

Next, permission of the Transformers Committee Executives was requested and received to ballot the main committee. Draft 9 was then submitted to the main committee for balloting. The results of this ballot are as follows:

108 ballots sent out - 82 returned (76%)

Of those returned: Approved - 68, Approved w/Comments - 4, Not Approved - 3, Not Voting - 7.

The negative ballots were discussed in detail at this meeting with the Working Group giving direction for resolution to most of the issues. The remaining issues will be discussed with their authors to see if an agreement can be reached. The appropriate changes will be made along with some editorial changes and the affected sections of the Guide will be submitted to the main committee for their approval.

The only new business item was a request by Olin Compton to recognize the outgoing Chairman, Don Cash, for his efforts on the Working Group.

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

Following this report, the PCS meeting attendees applauded Don for his outstanding efforts as Chairman of this Working Group and for his participation in other PCS activities.

VI. Project Reports

A. PC57.12.00h - LTC Position Indication - R. H. (Bob) Frazer

Bob Frazer could not attend this meeting. He sent the attached memo which the PCS Chairman read (Attachment PCS-C).

B. PC57.12.00i - Nameplate Information Change - J. W. (John) Matthews

John reported that a revised proposal, accompanied by definitions developed for these terms by Working Group Guides for Loading, was supposed to have been balloted in PCS prior to this meeting. This goal was not accomplished, but will be prior to the next meeting.

C. PC57.12.00k - Revision of C57.12.00, Table 16 - C. J. McMillen

Chuck reported that he will proceed to complete documentation for submission of this project to the Standards Board.

VII. Old Business - None

VIII. New Business - None

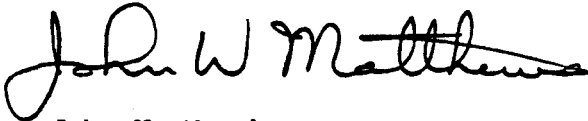
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IX. Next Meeting

The next meeting will be held on Tuesday, October 23, 1990, in Montreal, Canada.

The meeting was adjourned at 12:15 p.m.

Respectfully submitted,



John W. Matthews  
PCS Chairman

JWM.001



TC-L  
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WEST COAST TRANSFORMER SUBCOMMITTEE

Meeting Minutes  
Denver, CO  
March 27, 1990

The meeting was called to order at 10:05 AM. Introductions were made of the attendees, who were as follows:

Meeting Attendees

<u>NAME</u>	<u>COMPANY</u>	<u>MEMBER/ GUEST</u>
Ray Allustiarti	SAI Engineers	M
Dana Basel	ASEA Brown Boveri	G
Bob Clark	Montana Power Company	G
Fred Elliot	Bonneville Power Administration	G
Jens Erlingson	Pacific Gas and Electric Company	G
Dennis Gerlach (Chairman)	Salt River Project	M
Jim Gillies	Consultant	M
Michael Haas	National Industry Transformers	G
Bill Isberg	Isberg & Associates	M
Dan Nix	Stone and Webster	G
John Norberg	Seattle City Light	G
Ed Norton	Consultant	G
Sam Oklu (Vice Chairman)	LA Department of Water and Power	M
Bill Revell	Nevada Power	M
Steve Rowe	General Electric Company	G
Don Schaefer	Puget Power	G
Lou Tauber (Secretary)	Corps of Engineers	M
John Wood	Pacific Gas and Electric Company	G

Membership

John Norberg requested and was accepted for membership into the WCTSC. He will replace Herb Johnson as the representative from Seattle City Light. Ed Norton, a West Coast Consultant, was also accepted for membership.

Old Business

There was no old business to report.

### New Business

There was no new business to report.

### Future Meetings

The next meeting will be held in Portland, OR, in September. New officers will be elected at that meeting.

### Working Group Reports

PC 57,120 - Loss Evaluation Guide for Power Transformers and Reactors: The guide was recommended for approval with the condition of proper coordination document. There was some confusion on what coordination was required.

PC 57,93 - Guide for Installation of Liquid Immersed Power Transformers: Jim Gillies reported that we had balloted the working group and subcommittee. Not all ballots had been received as yet, i.e., only 9 of 19. A reminder letter will be sent out later this week requesting their response by April 20. It is the plan to ballot the main committee this summer. Jim said that it was still his hope to complete the Consolidation Guide this year.

PC 57,128 - Fire Prevention Protection Guide for Liquid Filled Power Transformers: It was reported that Herb Johnson, the Fire Protection Guide Chairman, had resigned and they were looking for another Chairman. David Sundin volunteered to take the position. With membership changes occurring since the last meeting of the working group, David made new assignments. The first drafts would be sent by July 1, 1990. The first draft will be reviewed in Portland at the next meeting of the subcommittee.

PC 57,114 - Seismic Guide for Power Transformers and Reactors: Sam reported that the standard was submitted to the Standards Board and was approved. Sam recommended that those starting new standards be very careful that liaison coordination be made as soon as possible to avoid problems down the road.

### General Discussions

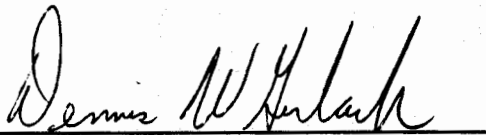
Jim Gillies expressed his concern with oil which had been refined in recent years. The use of this oil in smaller equipment, such as CTs, rather than large transformers, had shown tendencies of reduced life. Normal oil tests may not indicate the true life of, and the quality of the oil.

General Discussions Cont'd.

Bill Isberg mentioned a future topic of discussion regarding "Scada Ready" transformers, and what constitutes a "Scada Ready" transformer. It was also mentioned that a new future guide could be a "Guide to Transformer Monitoring and Controls".

Lou Tauber gave a brief description of the Hydroelectric Equipment Condition Indices Program, which is being worked on by the Corps of Engineers. This program is in the first stages for determining a set of uniform tests and equations for evaluating remaining equipment life. This included major pieces of equipment in the powerhouse, including transformers. This may constitute a future paper on presentation.

Respectfully submitted,



Dennis W. Gerlach  
Chairman  
West Coast Transformer Subcommittee

DWG/ca



Electric Power  
Research Institute

Leadership in Science and Technology

March 23, 1990

TC-M  
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TO: Mr. John D. Borst  
Secretary, IEEE Transformers Committee  
Westinghouse ABB Power T&D Company  
P.O. Box 883  
Jefferson City, MO 65102

FROM: Stan Lindgren, Project Manager 

SUBJECT: EPRI LIAISON REPORT

The following report is for inclusion in your minutes for the March 28, 1990 meeting.

1. EHV Converter Transformer:

- Test results confirmed 25% or greater major insulation size reduction can be attained with some further work.
- Final report is being published.

2. Amorphous Steel For Power Transformers:

- Improved through-put in the lamination consolidation process has been accomplished.
- A pilot facility automated cutting line is being fabricated.
- No problems have been reported with 500 kVA unit installed and placed in service June 1987. Core loss has declined several percent since the unit was installed.

*2500 kVA core loss higher than expected - still lower losses than Si-Fe*

3. Advanced Power Transformer:

- Reduced load loss feasibility has been demonstrated.
- Detailed analytical studies exploring individual design aspects has been completed.
- Phase II is underway which involves building a number of physical models to verify the design studies.

4. Static Electrification in Power Transformers:

- Suspected failure mechanism in over 18 core form and shell form FOA transformers worldwide.

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- Work is now focused on monitoring instruments and quantification of parameters for mathematical models.
- A project is underway to monitor a large FOA transformer in the field.
- A jointly sponsored EPRI/PSE&G Workshop was held 11/89 in Princeton, New Jersey.

5. Bubble Evolution in Overloaded Transformers:

- Very rapid load changes can cause bubble formulation under some conditions and reduce 60 Hz and impulse dielectric strength. This has been demonstrated in models with rapid/high O.L.
- Supplemental project with Westinghouse-ABB to better identify moisture conditions associated with bubbles and verify GE mathematical model was completed (Final Report EL6761).
- Additional supplemental project with ABB is starting.

6. Power Transformer With Two-Phase Cooling:

- 75% perchlorethylene, 25% oil.
- 65 MVA unit went into full service October 31, 1986.
- Unit is carrying normal load without incident including temporary 15% above nameplate.
- Final Report is EL 6794.

6. Active Transformer Noise Cancellation System:

- Noise reduction in one direction is being pursued first.
- An initial evaluation on a substation transformer was completed that demonstrated over 10 decibel reduction of 120 Hz with a small trial system.
- Two systems are being linked together to handle a larger transformer and improve reduction of higher frequencies.

SRL:sf:BORST

cc: Stig Nilsson  
Bob Veitch

7. AV CTA - Workshops at  
industry problems  
inadequate ANSI and IEEE standards  
8. PT tank rupture risk assessments  
- to start in late 1990

# TC-N

## INFORMATION REGARDING BALLOTING SERVICE PROVIDED BY IEEE STANDARDS DEPARTMENT:

The IEEE Standards Department will assist you in conducting letter ballots for your draft documents at the Subcommittee and Main Committee level, or as needed.

### You provide:

- A clear, single-sided copy of the draft;
- A classification list (user, producer, general interest, etc.) (required for main committee only, although it is desirable for subcommittees, as well);
- IEEE member number (for main committee) (although this is not mandatory that you provide us with this, it is most helpful);
- A brief cover letter (can be in draft form);
- List of names and addresses of group(s) to be balloted (those listed for information only should be listed separately).

### We will:

- Prepare final cover letter and letter ballot form in conformance with "A Guide to IEEE Standards Development";
- Duplicate your draft document as necessary;
- Enter names, classification and member numbers into our Fourth Dimension database;
- Have ballots returned to us for tally;
- Issue a second request to those who have not responded 10 days before balloting period ends;
- Provide you with a balloting summary (sufficient for submission to Standards Board for approval);
- Provide you with copies of all balloting form comments for your review.

For further information, please contact:

Sue Vogel  
IEEE Standards Department  
445 Hoes Lane, P. O. Box 1331  
Piscataway, NJ 08855-1331  
(201) 562-3817

4/3/90