IEEE PES
TRANSFORMERS
COMMITTEE

MEETING MINUTES

APRIL 1, 1992
BIRMINGHAM, ALABAMA

IEEE/PES TRANSFORMERS COMMITTEE
APRIL 1, 1992 - BIRMINGHAM, AL

MEMBERS PRESENT:

Adolphson, E. J.
Allen, B.F.
Altman, M. S.
Aubin, J.
Balgie, T. R.
Bancroft, R. A.
Barker, R. L.
Barnard, D. A.
Binder, Jr., W. B.
Boettger, W. E.
Bonucchi, J. V.
Borst, J. D.
Cambre, M.
Compton, O
Corkran, J. L.
Crofts, D. W.
Dahinden, V.
Davis, J. N.
Douglas, D. H.
Dudley, R. F.
Elliott, F. E.
Fallon, D. J.
Fisher, H. G.
Gearhart, R. E.
Gerlach, D. W.
Ghafourian, A. A.
Grubb, R. L.
Gryszkiewicz, F. J.
Hanus, K. S.
Harlow, J. H.
Heinrichs, F. W.
Henning W. R.
Hollister, R. H.
Hopkinson, P.J.
Howard, J. W.
Howells, E.
Hunt, J.
IIjima, P.
Jonnatti, A. J.
Jordan, R. D.
Kallaur, E.
Kappeler, C.P.
Kelly, J. J.
Kennedy, S. P.
Kennedy, W. N.
Kinney, Jr., J. P.
Kline, A.D.
Lewis, F. A.
Lindgren, S.
Lowdermilk, L.A.
Lowe, R. I.
Lowe, D. L.
Matthews, J. W.
Miller, C. K.
Mingoia, M. C.
Minkwitz, Sr., R. E.
Mitelman, M. I.
Moore, H. R.
Mutschler, Jr., W. H.
McGill, J. W.
McMillen, C. J.
McNutt, W. J.
Orehek, P. E.
Osborn, S. H.
Paiva, G. A.
Patel, B. K.
Patterson, W. F.
Patton, J. M.
Payne, P. A.
Pearce, H. A.
Pierce, L. W.
Platts, D. W.
Pollitt, J. M.
Rossetti, J. R.
Sampat, M. P.
Savio, L. J.
Saxon, W. E.
Scheu, R. W.
Sharma, D. N.
Sim, H. J.
Stahara, R. J.
Stein, W. W.
Stoner, R. W.
Sullivan, J. C.
Takach, D. S.
Teplitzky, A. M.
Thenappan, V.
Thompson, J. A.
Thompson, J. C.
Truax, D. E.
Uhl, W. B.
Uptegraff, Jr., R. E.
Vaillancourt, G. H.
Veitch, R. A.
Wagenaar, L. B.
Ward, B. H.
Whearty, R. J.
Wilks, A. L.
Williams, Jr., C. W.
Wood, J. G.
Wrenn, W. E.
Thomas,R.C.(emeritus)

MEMBERS ABSENT:

Allan, D. J.
Allustiarti, R.
Arnold, J. C.
Basel, D. L.
Brown, C. V.
Diamantis, T.
Ebert, J. A.
Edwards, K.
Fleeman, J. A.
Frydman, M.
Gillies, D. A.
Girgis, R. S.
Highton, K. R.
Hoefler, P. J.
Koenig, E.
Lackey, J. G.
Lazar, J. P.
Lee. R. E.
Light, H. F.
Massouda, K. T.
Mehta, S. P.
Millian, C.
Musil, R. J.
Norton, E. T.
Perco, D.
Peters, D. A.
Raymond, C. P.
Robbins, C. A.
Robertson, R. B.
Shenoy, V.
Smith, L. R.
Smith, S. D.
Stensland, L. R.
Stevens, F.
Sundin, D. W.
Swenson, L. A.
Tauber, L. A.
Templeton, J. B.
Traub, T. P.
Whitley, D. W.

IEEE/PES TRANSFORMERS COMMITTEE
APRIL 1, 1992 - BIRMINGHAM, AL

GUESTS PRESENT:

Andersen, G.
Antweiler, J.
Ayers, D. E.
Beaster, B. L.
Berneske, G. R.
Billings, D. L.
Bode, T.
Brooke, M.
Brown, J. L.
Carter, W. J.
Chadwick, R. E.
Chu, D.
Crouse, J. C.
Feghali, P. T.
Foldi, J.
Forrest, G. E.
Forsyth, B.
Frank, J. M.
Frazer, R. H.
Galloway, D. L.
Garcia, R.
Getson, D.
Gibeault, J. P.
Graham, R. D.
Haas, M. E.
Hancock, C. C.
Hansen, N. W.
Harley, J. W.
Hayes, R.
Henry III, G. E.
Holdway, T. L.
Huddleston, III, J. D.
Johnson, C. W.
Johnston, R. P.
Kirchnei, L.
Krause, P.
Kumar, B.
Lau, M. Y.
Long, J. E.
Lyon, D. S.
Maguire, W. A.
Marek, R. P.
Moore, S. P.
Morehart, W. E.
Murray, C. R.
McNeill, A.
McShane, C. P.
Nicholas, L.
Orten, D. E.
Parr, D. E.
Patel, D.
Pearson, L. C.
Pham, V. Q.
Poulin, B.
Provost, R. L.
Purohit, D.
Rajadhyaksha, M.
Reitter. G. J.
Rolling, D.
Rowe, G. W.
Russman, P.
Sankar, V. S. N.
Singh, P.
Smith, J. E.
Smith, J. E.
Sparagowski, G.
Valbuena, M.
Wakeam, R. D.
Willett, F. E.

IEEE/PES TRANSFORMERS COMMITTEE
MEETING MINUTES
BIRMINGHAM, ALABAMA
APRIL 1, 1992

I. **Chairman John Borst called the meeting to order at 8:00 a.m.** The agenda for the meeting is provided as Attachment TC-A.

II. **Chairman's Remarks**

A. Mr. Borst thanked our hosts, Bipin Patel and Aslam Risvi for their efforts. Mr. Risvi made housekeeping announcements. Mr. Patel thanked his staff for their work.

B. Meeting attendance was announced to be 279 registered, plus 46 spouses. Mr. Borst asked the hosts to thank Mr. Darrell Piat for his address Tuesday.

III. **Approval of Minutes**

The minutes of the November 6, 1991, Baltimore meeting were approved as submitted.

IV. **Vice Chairman's Report** (J. H. Harlow) - See Attachment ASC-0.

A. Report on technical papers (Publication Comm.)

B. Organization & Procedures Committee

C. Technical Sessions Improvement Committee

D. Technical Coord.

1. 1992 WPM had two sessions at which 9 papers were presented.
2. 1992 SPM will have two sessions; 13 papers submitted, 6 will be presented in Seattle.

E. Status of emeritus member

1. Voting members are expected to attend the meetings and to vote.
2. Emeritus members receive minutes; they are not required to vote and may return info. ballots.

V. **Subcommittee Reports**

A. ADSUBCOMM - J. D. Borst

1. Mr. Borst announced that the next meeting will be October 18-21, 1992 in Cleveland. The spring 1993 meeting will be March 28-31, 1993 in Portland, Oregon, hosted by Lou Tauber. The fall 1993 meeting will be October 30-November 1, 1993, in St. Petersburg and will be hosted by Jim Harlow and Charlie Williams; spring 1994 meeting will be in Dallas-Ft. Worth hosted by Ken Hanus; fall 1994 will be September 24-28, 1994 in Milwaukee hosted by Sam Mehta; and spring 1995 will be in Kansas City hosted by Henry Windich.

2. Chairman Borst recognized 12 new members.
3. Chairman Borst announced the passing of emeritus member Harold Margolis.

B. West Coast - Lou Tauber
The West Coast Subcommittee did not meet. Mr. Tauber's report is Attachment ASC-K.

C. Underground Transformers and Network Protectors - Paul Orehek - Mr. Orehek's report is Attachment TC-C.

D. Standards - Georges Vaillancourt
Mr. Vaillancourt's report is included as an attachment to the Administrative Subcommittee. See Attachment ASC-C.

1. The following standards were approved on March 19: C57.12.23, IEEE 637, IEEE 799, C57.12.40, C57.12.57, C57.12.80, C57.15, C57.98, C57.100. The following standards were extended March 19: C57.110, C57.117, and C57.12.56.
2. Mr. Vaillancourt discussed his membership on the PES SCC.
   a. Described the scope, membership, and purpose.
   b. Gave a report on the most recent SCC meeting.
   c. Standards Department Activity
      1) Balloting activity
      2) To have a document balloted IEEE they need:
         a) a clean, one-sided draft
         b) a copyright agreement form (contained in the Submittal Kit)
         c) each page of the draft should show the IEEE copyright note
         d) a cover letter addressed to the members of the balloting group explaining the reason for the ballot
         e) a list of the balloting group with correct addresses (the PES Transformers Committee list is updated and forwarded to IEEE by the committee secretary)
         f) a list of all coordination (from the approved PAR)
      3) 4-year life of PAR
      4) New Submittal Kit
         a) ballots cannot be sent by fax
         b) PARs cannot be sent by fax
         c) G. H. Vaillancourt is the submitter of PAR forms to IEEE
   d. Olin Compton asked about reaffirmation of standards by revision of portions of standards. Mr. Borst responded and Mr. Compton indicated he would bring forth a motion under new business to ask PES SCC to look into changing this practice.

E. Awards & Recognition - Bob Veitch
Mr. Veitch's report is contained as an attachment to the ADSUBCOMM minutes. See Attachment ASC-D. Mr. Veitch presented awards to a number of individuals.

F. Performance Characteristics - John Matthews:
Mr. Matthews' report is Attachment TC-D.

G. Insulation Life - Dave Douglas
Mr. Douglas' report is Attachment TC-E.

H. Insulating Fluids - Henry Pearce
Mr. Pearce's report is Attachment TC-F.

1. C57.104 & 106 being published.

I. Instruments TR - John Davis
Mr. Davis' report is Attachment TC-G.

1. Will pursue standards on field effect transducers with fiber optics.

J. HVDC Converter Transformers and Smoothing Reactors - Bill Kennedy - Mr. Kennedy's report is Attachment TC-H.

K. Dry Type Transformers - Wes Patterson
Mr. Patterson's report is Attachment TC-I.

1. Considering impulse tests on dry type
2. Resolved negatives on C57.12.5X series which were balloted for reaffirmation.

L. Distribution Transformers - Jerry Paiva reported for Frank Stevens who will resign. Jerry Thompson has been nominated by the Subcommittee to replace Mr. Stevens. See Attachment TC-J.

1. John Borst asked for procedures to be followed in selecting the Subcommittee Chairman.

M. Dielectric Tests - Mr. Templeton reported for Harold Moore.
Mr. Moore's report is Attachment TC-K.

N. Bushings - Loren Wagenaar
Mr. Wagenaar's report is Attachment TC-L.

O. Audible Sound and Vibration - Alan Teplitzky
Mr. Teplitzky's report is Attachment TC-M.

VI. Liaison Reports

A. EPRI - Stan Lingren
Mr. Lingren's report is Attachment TC-N.
1. HVDC Converter
2. Amorphous Steel
3. Advanced Power TR
4. Static Electrification

5. Bubble
6. Active TR Noise Cancellation
7. HV Inst. TRs
8. Tank Rupture
9. GIC
10. Thermal Models

Questions about EPRI GEM will cover bubble evolution model using loading guide. Equations will be available.

B. SCC4 - Paulette Payne
Ms. Payne's report is Attachment TC-0

VII. New Business

A. Motion from Olin Compton

Motion was passed by the 29 members present that the PES Administration be informed that this committee opposes the standards staff policy allowing reaffirmation of a standard without balloting. Motion carried and the committee secretary was instructed to prepare the required letter.

VIII. Adjournment

The meeting was adjourned at 11:55 a.m.

Respectfully submitted,

Wallace B Binder Jr

Wallace B. Binder, Jr.
Secretary

ATTACHMENTS TO MINUTES
IEEE/PES TRANSFORMERS COMMITTEE
BIRMINGHAM, ALABAMA
APRIL 1, 1992

TC-A Agenda
TC-B Administrative Subcommittee Minutes - Binder

- ASC-A Administrative Subcommittee Agenda - March 30, 1992
- ASC-B IEEE/PES Transformers Committee Attendance Statistics - Matthews
- ASC-C Standards Subcommittee Report - Vaillancourt
- ASC-D Recognition and Awards Subcommittee Report - Veitch
- ASC-E Chairman's Report - Borst
- ASC-F Audible Sound and Vibration Subcommittee Report - Teplitzky
- ASC-G Dry Type Transformer Subcommittee Report - Patterson
- ASC-H Insulating Fluids Subcommittee - Pearce
- ASC-I Dielectric Tests Subcommittee Report - Moore
- ASC-J Instrument Transformers Subcommittee Report
- ASC-K West Coast Subcommittee Report - Tauber
- ASC-L Distribution Transformers Subcommittee Report - Mingoia for Stevens
- ASC-M Underground Transformers and Network Protectors Subcommittee Report - Orehek
- ASC-N Insulating Fluids Subcommittee Report
- ASC-O Vice Chairman's Report - Harlow

TC-C Underground Transformers and Network Protectors Subcommittee Report - Orehek
TC-D Performance Characteristics Subcommittee Report - Matthews
TC-E Insulation Life Subcommittee Report - Douglas
TC-F Insulating Fluids Subcommittee Report - Pearce
TC-G Instrument Transformer Subcommittee Report - Davis
TC-H HVDC Converter Transformers and Smoothing Reactor Subcommittee Report - Kennedy
TC-I Dry-Type Transformer Subcommittee Report - Patterson
TC-J Distribution Transformers Subcommittee Report - Paiva for Stevens
TC-K Dielectric Tests Subcommittee Report - Templeton for Moore
TC-L Bushing Subcommittee Report - Wagenaar
TC-M Audible Sound and Vibration Subcommittee Report - Teplitzky
TC-N Liaison Report - EPRI - Lindgren
TC-O Liaison Report - SCC4 - Payne

TRANSFORMERS COMMITTEE

IEEE/PES TRANSFORMERS COMMITTEE MEETING
WEDNESDAY, APRIL 1, 1992

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

Secretary: W. B. Binder

1.	Chairman's Remarks and Announcements		J. D. Borst
2.	Approval of Minutes of November 6, 1991		J. D. Borst
3.	Vice Chairman's Report		J. H. Harlow
4.	Report of Subcommittees		
	4.0	Administrative	J. D. Borst
	4.1	West Coast	L. A. Tauber
	4.2	Underground Transformers & Network Protectors	P. E. Orehek
	4.3	Transformer Standards	G. H. Valliancourt
	4.4	Recognition and Awards	R. A. Veitch
	4.5	Performance Characteristics	J. W. Matthews
	4.6	Insulation Life	D. H. Douglas
	4.7	Insulating Fluids	H. A. Pearce
	4.8	Instrument Transformers	J. N. Davis
	4.9	HVDC Converter Transformers & Reactors	W. N. Kennedy
	4.10	Dry-Type Transformers	W. Patterson
	4.11	Distribution Transformers	F. Stevens
	4.12	Dielectric Tests	H. R. Moore
	4.13	Bushing	L. B. Wagenaar
	4.14	Audible Sound and Vibration	A. M. Teplitzky
5.	Reports of Liaison Representatives:		
	5.1	EPRI	S. R. Lindgren
	5.2	Discussion of Other Liaison Reports	
6.	New Business		

IEEE/PES TRANSFORMERS COMMITTEE
ADMINISTRATIVE SUBCOMMITTEE
MARCH 30, 1992
BIRMINGHAM, AL

I. INTRODUCTION OF MEMBERS AND GUESTS

Chairman John Borst called the meeting to order at 6:30 p.m. The following members and guests were present:

MEMBERS:	W. B. Binder	J. W. Matthews	L. A. Teplitzky
	J. N. Davis	H. R. Moore	L. A. Tauber
	D. H. Douglas	P. E. Orehek	G. H. Vaillancourt
	J. H. Harlow	W. Patterson	R. A. Veitch
	W. N. Kennedy	H. A. Pearce	L. B. Wagenaar

GUESTS: M. Mingoia - representing Frank Stevens
Bipin Patel - Birmingham co-host
Aslam Rizvi - Birmingham co-host

II. HOST REPORTS

Birmingham - Mr. Patel reported a total of 325 attendees, including 46 spouses.

Cleveland - Mr. Douglas reported that the Cleveland meeting will be at the Sheraton City Center Hotel on October 18-21, 1992. Hotel charges will be $93/night plus 13% room tax for a single or double. Registration will be $55 each and $25 for spouses.

Baltimore - Mr. Matthews presented his final report to the subcommittee. The surplus grew after the Baltimore meeting to over $4700.

FUTURE MEETINGS:

DATE	LOCATION	HOST
Oct. 18-21, 1992	Cleveland, OH	D. Douglas
March 28-31, 1993	Portland, OR	L. Tauber
Oct. 31 - Nov. 3, 1993	St. Petersburg	J. Harlow/C. Williams
Spring 1994	Dallas/Ft. Worth	K. Hanus
Sept. 24-28, 1994	Milwaukee	S. Mehta
Spring 1995	Kansas City	H. Windisch

Hosts are requested for fall of 1995 and beyond.

Mr. Matthews provided the updated attendance statistics which are attached. The Committee secretary will keep these statistics in the future.

III. MINUTES AND AGENDAS

The minutes of the Baltimore Administrative Subcommittee and the agenda for this meeting were approved as submitted.

IV. STANDARDS SUBCOMMITTEE

Mr. Vaillancourt has reorganized his report to supply more information. It includes names and phone numbers of other Committee liaisons. It also shows the status of C57.12.00 and C57.12.90 projects. It lists standards in the C57 series for which no permanent subcommittee has been selected. After some discussion, the recently transferred C57.12.5X standards were assigned to the Dry Type Transformers Subcommittee. (The C57.12.13 standard had previously been assigned for review and possible adoption to the West Coast Subcommittee from the HVACC.) There was additional discussion about the need to ballot the Transformers Committee for approval of the transfer of the C57.12.2X series of standards. Mr. Vaillancourt will contact the standards staff on this matter. A new standards submittal kit has been issued to all Working Group chairmen. It contains a new standards manual, a new PAR form and a new document submittal form. All PARs received after May 7, 1992, must be on the new form and will have a four-year life.

There was a report on the Task Forces to Consolidate Changes to C57.12.00 and C57.12.90.

V. IEEE STANDARDS REPORT

No one from the staff was able to attend the meeting. There was no report.

IV. STATUS OF ANSI C57 COMMITTEE

There was no report. Paul Orehek announced that there will be a meeting of the C57 Executive Committee on Wednesday afternoon.

VII. PES AWARDS

Mr. Veitch reported that the 1992 Transformers Committee Prize Paper Award will go to Linden Pierce, and the 1992 Transformers Committee Outstanding Working Group Award will go to Bipin Patel. Certificates of appreciation will be awarded to:

Wallace Binder
Joseph Bonucchi
Don Kline
Eton Koenig
Jack McGill
Harold Moore
Bipin Patel
Len Stensland
Robert Veitch

VIII. REPORT OF TECHNICAL COUNCIL ACTIVITIES

C62.1 Insulation Coordination will be sponsored by TC until a permanent sponsor can be found.

Summer general meeting of 1997 will be held in Europe.

The 1991 T&D Conference had 14,000 registrants and made $1 million.

IX. SUBCOMMITTEE ACTIVITIES

A. Audible Sound & Vibration Subcommittee. Mr. Teplitzky's report is attached.

B. HVDC Subcommittee. Mr. Kennedy requested moving his S.C. time into the second and third slots following the W.G. on Dry Type Smoothing Reactors. This change will be implemented at the Cleveland meeting.

C. Dry Type Transformers Subcommittee. Mr. Patterson's report is attached.

D. Insulating Fluids Subcommittee. Mr. Pearce's report is attached.

E. Bushings Subcommittee. Mr. Wagenaar reported that he is working with an editor on C57.19.00 and C57.19.01. A revision of C57.19.101 has been submitted for June 1992.

F. Dielectric Tests Subcommittee. Mr. Moore's report is attached. The Task Force on Revision to Enhancement Voltage Time will be terminated. A new Task Force to examine the induced test with acceptance criteria will be established and needs a chairman.

G. Insulation Life Subcommittee. Mr. Douglas reported on problems with C57.100 which applies to distribution transformers and is in the process of adding power transformers. The level of required adherence differs. Additional analysis will be required.

H. Instrument Transformers Subcommittee. Mr. Davis' report is attached.

I. West Coast Subcommittee. Mr. Tauber's report is attached.

J. Distribution Transformers Subcommittee. Mr. Mingoia reported for Frank Stevens. Mr. Stevens will be resigning. Jerry Thompson will be nominated to be chairman of the SC. Six working group meetings were held on Monday. Two standards have been completed and balloted. The Joint Working Group on Enclosure Integrity has voted to request transfer into the Transformers Committee.

K. UG Distribution and Network Protectors Subcommittee. Mr. Orehek's report is attached. Mr. Orehek also reported on response problems with IEEE staff. This item will appear on the next agenda.

L. Performance Characteristics Subcommittee. Mr. Matthews' report is attached. Mr. Matthews also announced a seminar for the last session Tuesday afternoon in Cleveland on LTCs. Mr. Matthews brought up a request for additional nameplate information from Mr. Orehek. After some discussion, it was decided to let the SC decide on the matter.

X. VICE CHAIRMAN'S REPORT

Mr. Harlow's report is attached.

XI. SECRETARY'S REPORT

Mr. Binder announced the passing of Mr. Harold Margolis.

Twelve new membership applications were submitted and approved. They are:

Mr. T. R. Balgie - Virginia Power (U)
Mr. R. L. Barker - Virginia Power (U)
Mr. W. E. Boettger - ABB Power T&D (P)
Mr. E. Kallaur - Hartford Steam Boiler (U)
Mr. F. A. Lewis - TVA (U)
Mr. D. L. Lowe - Kuhlman (P)
Mr. S. H. Osborn Jr. - Doble Engineering (GI)
Mr. J. Rossetti - Memphis Light (U)
Mr. R. Stoner - PSI Energy (U)
Mr. J. C. Sullivan - Tampa Electric (U)
Mr. J. B. Templeton - ABB Power T&D (P)
Mr. C. W. Williams Jr. - Florida Power (U)

XII. NEW BUSINESS

There was no new business.

XIII. ADJOURNMENT

Mr. Borst adjourned the meeting at approximately 10:30 p.m.

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IEEE / PES TRANSFORMERS COMMITTEE

Administrative Subcommittee Meeting
Monday, March 30, 1992 at 6:00 p.m.
Wynfree Hotel, Birmingham, Alabama

A G E N D A

1. Introduction of Members and Guests

2. Approval of the Baltimore Meeting Minutes

3. Additions to and/or Approval of the Agenda

4. Committee Finances and Meeting Arrangements
   Birmingham Hosts – B. Patel, Southern Company Services
   A. Rizvi, Alabama Power Company
   Cleveland Host – D. Douglas, Centerior Energy

5. Standards Subcommittee – G. Vaillancourt
   . Standards Status
   . PES Standards Coordinating Committee

6. Status of IEEE Standards – S. Vogel / A. Salem

7. Status of ANSI C57 Committee – L. Savio

8. Review of PES Awards Committee – R.A. Veitch

9. Review of Technical Council Activities – J.D. Borst

10. Subcommittees' Activities Discussion – Subcommittee Chairmen

11. Vice Chairman's Report – J.H. Harlow
    . Technical Papers/Sessions
    . PES Technical Council Committees
    – Organization and Procedures
    – Technical Sessions Improvement
    – Publications

12. Secretary's Report – W.B. Binder
    . Membership Review
    . New Member Applications Approval

13. New Business

14. Adjourn

Figure 3 - IEEE/PES TRANSFORMERS COMMITTEE ATTENDANCE STATISTICS

GROUP	Long Beach Nov. 1988	Chicago Apr. 1989	Charlotte Oct. 1989	Denver Mar. 1990	Montreal Oct. 1990	Phoenix May 1991	Baltimore Nov. 1991	MAXIMUM	AVERAGE
Committee Registration: Members and Guests	177	160	200	202	257	237	247	257	211
Spouses	47	37	42	52	74	63	59	74	53
Luncheon	?	90	?	110	128	140	117	140	117
SC ADMINISTRATIVE	17	19	18	20	24	19	21	24	20
SC AUDIBLE SOUND AND VIBRATION	24	27	29	26	19	0	25	29	25
SC BUSHINGS	16	21	14	16	23	26	37	37	22
WG Bushing Application Guide	13	0	13	21	29	25	19	29	20
WG DC Applications of Bushings	7	16	14	12	14	13	14	16	13
WG Revision C57.19.01	-	-	-	-	-	-	11	11	11
SC DIELECTRIC TESTS	76	67	77	81	88	78	72	88	77
WG Revision of Dielectric Tests	22	27	32	33	35	48	53	53	36
TF Rev. of Impulse Test Guide	19	22	41	41	55	38	47	55	38
TF Enhancement Voltage Time	-	-	-	16	?	22	25 *	25	21
WG Rev. Dielectric Tests on Distr. Transf.	29	29	39	28	30	27	21	39	29
TF Low Side Surge Req. for Distr. Transf.	20	23	27	26	19	?	25 *	27	23
TF Rev. Distr. Impulse Guide	-	-	-	-	?	?	25 *	25	25
WG Partial Discharge Tests	44	41	46	44	24	42	67	67	44
TF Acoustic Detection of Partial Discharge	13	19	16	22	?	20	22	22	19
TF Measurement of Apparent Charge	29	21	21	13	16	17	22	29	20
SC DRY-TYPE TRANSFORMERS	23	26	25	28	31	32	29	32	28
WG Test Code C57.91	-	-	23	28	29	28	22	29	26
WG Dry-Type Dielectric Problems	28	16	30	25	21	29	0	30	25
WG Dry-Type Reactors	7	8	8	12	10	9	12	12	9
WG Dry-Type Thermal Eval. and Flammability	18	18	23	22	?	28	0	28	22
WG Dry-Type Thermal Problems	26	16	30	27	24	29	0	30	25
WG Insulation Req. for Specialty Transf.	8	13	11	10	10	19	12	19	12
WG Cast Coil Loading Guide	-	-	-	-	20	30	22	30	24
SC HVDC CONVERTER TRANSFS. AND REACTORS	10	9	12	15	15	11	9	15	12
SC INSTRUMENT TRANSFORMERS	13	17	12	11	22	13	22	22	16
SC INSULATING FLUIDS	33	22	25	33	34	36	54	54	34
WG Gas Analysis During Factory Tests	-	-	39	36	36	72	-	72	46
SC INSULATION LIFE	44	64	50	71	61	81	91	91	66
WG Guides for Loading	49	38	41	47	44	51	62	62	47
TF Loss of Insulation Life	-	-	-	-	12	32	18	32	21
WG Thermal Eval. of Distr. and Power Transf.	?	?	46	44	67	56	35	67	50
WG Thermal Tests	14	14	16	20	22	30	54	54	24
WG High Temperature Insulation	-	-	-	-	-	46	33	46	40

* = estimated

Figure 3(cont'd) - IEEE/PES TRANSFORMERS COMMITTEE ATTENDANCE STATISTICS

GROUP	Long Beach Nov. 1988	Chicago Apr. 1989	Charlotte Oct. 1989	Denver Mar. 1990	Montreal Oct. 1990	Phoenix May 1991	Baltimore Nov. 1991	MAXIMUM	AVERAGE
SC PERFORMANCE CHARACTERISTICS	76	67	77	77	85	86	89	89	80
WG Failure Analysis Guide	53	50	33	42	31	28	0	53	40
WG Loss Tolerance and Measurement	41	31	24	35	37	26	20	41	31
TF Loss Measurement Guide	?	?	24	?	?	?	40 *	40	32
TF Low Power Factor Measurements	-	-	-	-	-	-	15 *	15	15
WG LTC Performance Requirements	20	35	28	31	30	25	41	41	30
WG Qualification of Class 1E Nuclear Tr.	5	5	10	6	4	0	0	10	6
WG Revision C57.109	-	-	-	-	-	26	27	27	27
WG Semi-Conductor Rectifier Transformers	21	19	17	0	23	30	23	30	22
SC WEST COAST	12	20	0	18	8	10	0	20	15
WG Consolidation of Installation Guides	10	?	0	?	0	?	0	10	10
WG Seismic Guide	8	?	0	?	0	?	0	8	8
WG Loss Evaluation Guide	?	?	0	?	0	?	0	?	?
WG Fire Protection	?	?	0	?	0	?	0	?	?
SC DISTRIBUTION TRANSFORMERS	-	-	-	-	36	28	23	34	28
WG Overhead Type Distr. Transfs. C57.12.20	-	-	-	-	?	23	20 *	23	22
WG Single-Phase Live Front Padmount C57.12.21	-	-	-	-	?	14	25 *	25	20
WG Three-Phase Live Front Padmount C57.12.22	-	-	-	-	?	15	20 *	20	18
WG Single-Phase Submersible C57.12.23	-	-	-	-	?	0	20 *	20	20
WG Single-Phase Deadfront Padmount C57.12.25	-	-	-	-	?	28	25 *	28	27
WG Three-Phase Deadfront Padmount C57.12.26	-	-	-	-	?	0	25 *	25	25
WG Bar Coding	-	-	-	-	?	-	29	29	29
WG Joint C57/37 on Cabinet Integrity C57.12.28	-	-	-	-	?	0	0	0	0
SC UNDERGROUND TRANSFS. AND NETWORK PROTECTORS	-	-	-	-	25	21	18	25	21
WG Three-Phase Underground Transfs.	-	-	-	-	19	16	15	19	17
WG Liquid-Filled Sec. Network Transfs.	-	-	-	-	19	21	22	22	21
WG Secondary Network Protectors	-	-	-	-	17	16	22	22	18
WG Dry-Type Network Transfs.	-	-	-	-	31	29	25	31	28

NOTE: Maintain data for last four years only.

/123DATA/TCATTEND

* = estimated

DATE: April 1, 1992

TO: Members of IEEE Transformers Committee

FROM: Georges H. Vaillancourt, Standards Subcommittee Chairman

SUBJECT: Standards Activities since the Baltimore Meeting

TRANSFORMERS STANDARDS AND COORDINATION ACTIVITIES

The status of all transformer standards or projects sorted by responsible subcommittees is reported in attachment 1. Attachment 2 gives a list of current status and unconsolidated changes under way on standards C57.12.00 and C57.12.90. Most of these changes have now been ballotted individually through the Transformers Committee and are ready to be incorporated in the 1992 revision of these two very important standards.

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

Attachment 4 is a report on coordination activities for documents that are sponsored by other committees or societies and for which the Transformers Committee has requested coordination.

PES STANDARDS COORDINATING COMMITTEE MEETING

The Standards Coordinating Committee met in New York on monday January 27, 1992. The main topics discussed at that meeting were as follows:

Awards: The chairman Mr. Fred Kimsey reported that PES will be issuing awards for two prize papers, outstanding committee technical report and a standard/guide.

Outdated standards: At their december 4, 1991 meeting REVCOM recommended withdrawal of 15 PES sponsored documents due to unsufficient information on status of those standards (fortunately none were sponsored by the Transformers Committee). SCC members were urged to stay abreast of the activities and keep IEEE standards staff posted.

Report of Standards Department Activities: Sue Vogel reported significant increase in the use of Standards staff for ballotting activities. Revised "Submittal forms" and "PAR's" were circulated to the group for review and comments. Old PAR form (dated 1/1/90) will be accepted until May 7, 1992 only. At that time anything other than the new PAR will be returned to the submitter for re-submission. (A standard and PAR submittal kit update should now have been received by all subcommittee and working group chairpersons and it includes the new PAR form). As of 1/1/92 faxed submittal are no longer accepted due to signature requirements coupled with the use of scanning devices. This means that hard copy of submittal will need to be received at the Standards Office by the deadline date. A major addition to the coordination requirements for all the documents is the inclusion of SCC 10 and SCC 14. Standards staff will perform this fonction if requested.

New SCC Operating Procedures: A discussion on the modified operating procedures took place. Coordination within PES will be revised to include circulation of informational copies of draft documents but not requiring a response. The PES technical committee would then be excluded from the listing of required coordinating bodies on the PAR. The coordination form will be revised to reflect this change.

PAR life: With the approval of 4 year life for new PAR's a question was raised concerning existing PAR's. REVCOM is to decide if this will apply also to them. REVCOM would also need to establish some date for this to become effective.

Common data base for coordination: Further discussion was held on utilizing a data base common to all PES Committees for compiling PES standards and tracking coordination requirements.

Next Meeting: The PES SCC meeting will take place in Seattle, WA during the Summer Power Meeting on July 13, 1992.

REVISION OF COORDINATION FORM OF STANDARDS COORDINATING COMMITTEE

In february 1992, the new december 1991 revision of SCC operating procedures was distributed to liaison representatives and includes a new version of the coordination form (attachment 5), which makes a distinction between request for formal coordination and request for information copy only. With the old form no such distinction existed and oftentimes, coordination was requested by a committee for the sole purpose of getting information. It is expected that the new form will help to reduce some of the approval delay due to coordination.

DOCUMENTS SUBMITTED TO STANDARDS BOARD

REVCOM 12/04/91 (Standards)

PC57.13.2	Approved, Transfer to TC approved
C57.113	Approved as full-use guide

NESCOM 12/04/91 (PAR's)

PC57.12.20	Approved
PC57.12.26	Approved
PC57.12.40	Approved
PC57.12.57	Approved
PC57.96	Approved

REVCOM 03/18/92 (Standards)

C57.13.1	Reaffirmed
C57.12.23	Revision approved
IEEE 637	Reaffirmed
IEEE 638	Approved
IEEE 799	Reaffirmed
C57.12.40	Reaffirmed
C57.12.57	Reaffirmed
C57.12.80	Reaffirmed
C57.15	Reaffirmed
C57.98	Reaffirmed
C57.100	Reaffirmed
C57.110	Extended to 03/23/93
C57.117	Extended to 03/23/93
C57.12.56	Extended to 03/23/93

NEXT STANDARDS BOARD MEETINGS

Deadline for Submittal	Meeting Date
May 8, 1992	June 19, 1992
August 7, 1992	September 9, 1992
October 23, 1992	December 3, 1992

NEW C57 STANDARD COLLECTION BOOK

A new 1992 edition of the C57 Standard Collection book has been published and can now be ordered from the IEEE Standards Department.

Submitted by: G. H. Vaillancourt

G. H. Vaillancourt

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 1

*STANDARD / PROJECT	*TITLE / PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
**SUBCOMMITTEE: ANSI C57.12.1 / CHAIRPERSON: NONE ASSIGNED / PHONE:							
*C57.12.10	*TRANSFORMERS 230kV AND BELOW -8333/10417kVA 1 PH, -100000 kVA 3 PH w/o LTC, -100000kVA w/ LTC - SAFETY REQUIREMENTS			*,,,,,			
NONE	06/04/87	NONE ASSIGNED			/ /	/ /	
**SUBCOMMITTEE: ASSIGNED TO MANY SUBCOMM. / CHAIRPERSON: MANY / PHONE:							
*C57.12.00	*GEN REQ. FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS			*,,,,,			CONSOLIDATING CHANGES FOR 1992
VARIOUS	03/20/87			W. B. BINDER	/ /	/ /	SUBMIT REVISIONS BY MAY, 1992
*C57.12.90	*STANDARD TEST CODE FOR LIQUID- IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF			*,,,,,			CONSOLIDATING CHANGES FOR 1992
VARIOUS	03/18/87			G. H. VAILLANCOURT	/ /	/ /	SUBMIT REVISIONS BY MAY, 1992
**SUBCOMMITTEE: AUDIBLE SOUND & VIBRATION / CHAIRPERSON: A. M. TEPLITSKY / PHONE: (212)460-4859							
*C57.112	*GUIDE FOR THE CONTROL OF TRANSFORMER SOUND			*NONE,,,,,			NEW TASK FORCE TO START WORK
P523	/ /	SUBCOMMITTEE	A.M.TEPLITSKY		12/28/73	11/01/89	CHECK FILES FOR NEWER PAR
*C57.12.90	*TRANSFORMER SOUND POWER MEASUREMENT			*EM,NEMA,,,,			APPROVED BY MAIN COMMITTEE
PC57.12.90b	/ /	SUBCOMMITTEE	A. M. TEPLITSKY		03/01/86	/ /	INCLUDE IN 1992 REVISION
**SUBCOMMITTEE: BUSHING / CHAIRPERSON: L. B. WAGENAAR / PHONE: (614)223-2259							
*C57.19.03	*STANDARD REQUIREMENTS, TERMINOLOGY AND TEST CODE FOR BUSHINGS FOR DC APPLICATIONS			*SPD,IC,SWGR,,,			WORKING ON DRAFT
PC57.19.03	/ /	BUSHINGS FOR DC APPLICATION	OLOF HEYMAN		11/09/89	02/01/92	SF6 BUSHINGS NOT INCLUDED
*C57.19.100	*GUIDE FOR APPLICATION OF APPARATUS BUSHINGS.			*SWGR,SUB,PSR,,,			RESOLVING BALLOT COMMENTS
P800	/ /	BUSHING APPLICATION GUIDE	F. E. ELLIOTT		09/27/79	01/20/92	

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE
ATTACHMENT 1

*STANDARD / PROJECT	*TITLE / PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.19.101	*TRIAL-USE GUIDE FOR LOADING POWER APPARATUS BUSHINGS			*,,,,,			FULL USE BALLOT SUCCESSFUL
P757	10/20/88	BUSHING APPLICATION GUIDE	F. E. ELLIOTT		/ /	/ /	SUBMITTAL SENT 02/04/92
*IEEE 21	*GENERAL REQUIREMENTS AND TEST PROCEDURES FOR OUTDOOR APPARATUS BUSHINGS			*T&D,PSR,IC,SWGR,,			APPROVED BY STD BOARD 09/26/91
PC57.19.00	07/23/76	SUBCOMMITTEE	L. B. WAGENAAR		04/01/79	01/31/90	TO BE PUBLISHED
*IEEE 24	*STANDARD PERFORMANCE CHARACTERISTICS AND DIMENSIONS FOR OUTDOOR APPARATUS BUSHINGS			*SPD,IAS,IC,SWGR,,			PAR FOR REV.TO BE SUBMITTED
PC57.19.01	08/05/83	REVISION TO C57.19.01	PRIT SINGH		11/01/89	02/04/91	APP.BY REVCOM 09/26/91
**SUBCOMMITTEE: DIELECTRIC TESTS / CHAIRPERSON: H. R. MOORE / PHONE: (904)729-1391							
*C57.113	*GUIDE FOR PARTIAL DISCHARGE MEASUREMENT IN LIQUID-FILLED POWER TRANSFORMERS AND SHUNT REACTOR			*,,,,,			APPROVED AS FULL GUIDE, DEC 91
P545	01/01/88	P. D. TESTS FOR TRANSFORMERS	E. HOWELLS		09/25/91	/ /	WAITING PUB. & ANSI APPROVAL
*C57.127	*GUIDE FOR THE DETECTION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL- IMMERSED POWER TRANSFORMERS			*T&D,ED&PG,CIGRE,IEC,,			REBALLOT MAIN COMMITTEE
PC57.127	/ /	P. D. TESTS FOR TRANSFORMERS	E. HOWELLS		03/10/88	10/01/89	WAITING FOR BALLOT
*C57.12.00	*NEW SEC 6.8 MINIMUM EXTERNAL CLEARANCES BETWEEN LIVE PARTS			*,,,,,			COMPLETE
PC57.12.00j	/ /	NOT SPECIFIED	R. A. VEITCH		12/28/86	/ /	INCLUDE IN 1992 REVISION
*C57.12.90	*ROUTINE IMPULSE TESTS FOR DISTRIBUTION TRANSFORMERS			*RMC,PSC,,,,			MAIN COMMITTEE BALLOT COMPLETE
PC57.12.90c	/ /	REV. DIELECTRIC TESTS DIST TR	JOHN ROSETTI		09/10/87	/ /	INCLUDE IN 1992 REVISION
*C57.12.90	*ENHANCEMENT VOLTAGE TIME DURATION DURING POWER TRANSFORMER INDUCED TESTS			*,,,,,			DRAFT 1 BEING PREPARED
PC57.12.90d	/ /	REVISION OF DIELECTRIC TESTS	J. B. TEMPLETON	M. ALTMAN	09/28/90	/ /	
*C57.21	*REQUIREMENTS, TERMINOLOGY AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA			*NONE,,,,,			COMPLETE
PC57.21a	04/02/91	DIELC TESTS OF SHUNT REACTORS	W. N. KENNEDY		12/11/86	/ /	ANSI APPROVED 08/09/91

*STANDARD / PROJECT	*TITLE / PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.98	*ROUTINE TEST GUIDE FOR DISTRIBUTION TRANSFORMERS			*T&D,PSIM,,,,			SUBMITTED PAR TO STD BOARD
NEW	/ /	REV. DIELECTRIC TESTS DIST TR	JOHN ROSETTI	D. E. BALLARD	09/25/91	/ /	
*C57.98	*IEEE GUIDE FOR TRANSFORMER IMPULSE TESTS			*NONE,,,,,			SW SURGE BALLOTTING MAIN COMM
PC57.98	06/01/86	REVISION OF DIELECTRIC TESTS	J. B. TEMPLETON	R. E. MINKWITZ, SR.	02/01/86	12/02/91	REAFFIRMED 03/18/92
*NEW	*GUIDE FOR THE LOCATION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS			*,,,,,			BALLOTTING WORKING GROUP
NO PAR YET	/ /	P. D. TESTS FOR TRANSFORMERS	E. HOWELLS		/ /	03/30/92	SUBMIT PAR AS SOON AS POSSIBLE

**SUBCOMMITTEE: DISTRIBUTION TRANSFORMERS / CHAIRPERSON: J. C. THOMPSON / PHONE: (704)373-5139

*C57.12.20	*OVERHEAD-TYPE DISTRIBUTION TRANSFORMERS, 500 kVA AND SMALLER: H V 34500 VOLTS AND BELOW, L V 7970/13800Y & BELOW			*T&D,IAS/REP,SCC14,,,			PAR APPROVED BY NESCOM
PC57.12.20	01/11/88	POLE MOUNTED DISTRIBUTION TR	J. C. THOMPSON		12/05/91	03/17/92	NESCOM REQUEST SCC14 COORD.
*C57.12.21	*STANDARD REQUIREMENTS FOR PAD- MOUNTED, COMPARTMENTAL-TYPE, SELF-COOLED, SINGLE-PHASE DIST TRANSFORMERS WITH HV BUSHINGS			*T&D,IAS/REP,,,,			PAR APPROVED BY STD BOARD
PC57.12.21	10/22/79	3-PHASE PADMOUNT TR LIVE FRONT	A. GHAFOURIAN		06/27/91	02/01/92	PREVIOUSLY APPROVED
*C57.12.22	*PAD-MOUNTED,COMPARTMENTAL-TYPE SELF-COOLED,3-PHASE DIST. TR WITH HV BUSHINGS,2500kVA AND SMALLER:...REQUIREMENTS.			*T&D,IAS/REP,IAS/PSE,,,			PAR APPROVED BY STD BOARD
PC57.12.22	05/10/89	3 PHASE PADMOUNT TR LIVE FRONT	KEN HANUS		06/27/91	02/03/92	PLAN TO COMPLETE IN 1992
*C57.12.23	*UNDERGROUND-TYPE,SELF-COOLED, 1-PHASE DISTRIBUTION TR WITH SEPERABLE INSULATED HV CONNECT HV 24940GrdY..LV,240..;167kVA.			*T&D,IC,IAS/REP,IAS/PSE,,			PAR APPROVED BY STD BOARD
PC57.12.23	09/19/85	1-PHASE SUBMERSIBLE TR	GERRY PAIVA		06/27/91	01/03/91	SUBMITTED TO SB 03/18/92
*C57.12.25	*REQUIREMENTS FOR PAD-MOUNTED COMP-TYPE,SELF-COOLED,1-PHASE DISTRIBUTION TR W/SEP INS HV CONN,HV 34500GrdY...167kVA...			*T&D,IC,IAS/REP,IAS/PSE,,			PAR APPROVED BY STD. BOARD
PC57.12.25	05/11/90	1-PHASE PADMOUNT TR DEADFRONT	NORVIN MOHESKY		06/27/91	/ /	NEMA SECRETARIAT
*C57.12.26	*PAD-MOUNTED COMPARTMENTAL-TYPE SELF-COOLED,3-PHASE DIST TR for USE W/ SEPERABLE INSULATED HV CONN.,HV 34500GrdY..2500kVA			*T&D,IC,IAS/REP,IAS/PSE,SCC14,			COMPLETE
PC57.12.26	04/16/86	3-PHASE PADMOUNT TR DEADFRONT	GERRY PAIVA		12/05/91	/ /	SUBMITTAL TO SB IN PROGRESS

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE
ATTACHMENT 1

*STANDARD / PROJECT	*TITLE	PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.12.27	*CONFORMANCE REQUIREMENTS for LIQUID-FILLED DISTRIBUTION TR USED IN PAD-MOUNTED INSTALL., INCL. UNIT SUBSTATIONS				*T&D,IAS/REP,IAS/PSE,,,			DOCUMENT NOT USED BY INDUSTRY
PC57.12.27		09/02/81	UNIT SUBSTATIONS	JIM LYONS		06/27/91	/ /	W.G. RECOMMENDS WITHDRAW STD
*C57.12.28	*PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY				*,,,,,			PAR TO BE SUBMITTED
PC57.12.28		06/24/87	JOINT WG ON CABINET INTEGRITY	FRANK STEVENS		/ /	/ /	BALLOT TRANSFER TO TR COMM
*C57.12.29	*PAD-MOUNTED EQUIPMENT - ENCLOSURE INTEGRITY IN COASTAL ENVIRONMENTS				*,,,,,			APPROVED BY SUBCOMMITTEE
PC57.12.29		/ /	JOINT WG ON CABINET INTEGRITY	FRANK STEVENS		/ /	/ /	BALLOT TRANSFER TO TR COMM
*C57.12.30	*SUBMERSIBLE EQUIPMENT - ENCLOSURE INTEGRITY				*,,,,,			PAR TO BE SUBMITTED
PC57.12.30		/ /	JOINT WG ON CABINET INTEGRITY	FRANK STEVENS		/ /	/ /	BALLOT TRANSFER TO TR COMM
*C57.12.31	*COATING STANDARD FOR POLE MOUNTED TRANSFORMERS				*,,,,,			PAR TO BE SUBMITTED
PC57.12.31		/ /	JOINT WG ON CABINET INTEGRITY	FRANK STEVENS		/ /	/ /	BALLOT TRANSFER TO TR COMM
*IEEE1265	*STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)				*AIM/TSC,IAS/REP,,,,			PAR APPROVED 06/27/91
P1265		/ /	BAR CODE STANDARD	RON JORDAN		06/27/91	03/20/92	
**SUBCOMMITTEE: DRY-TYPE POWER TRANSFORMERS / CHAIRPERSON: W. PATTERSON / PHONE: (703)688-3325								
*C57.12.50	*REQ. FOR VENTILATED DRY-TYPE DISTRIBUTION TR, 1-500kVA, 1 PHASE, AND 15-500kVA, 3-PHASE HV 601-34500VOLTS,LV 120-600V				*,,,,,			BALLOTTING TRANSFER TO TR COMM
NONE		08/15/80	NONE ASSIGNED			/ /	/ /	BALLOTTING REAFFIRMATION
**SUBCOMMITTEE: DRY-TYPE TRANSFORMERS / CHAIRPERSON: W. PATTERSON / PHONE: (703)688-3325								
*C57.124	*RECOMMENDED PRACTICE FOR THE DETECTION OF PD AND THE MEAS. OF APP. CHARGE IN DRY-TYPE TR				*NONE,,,,,			APPROVED BY STD BOARD 6/26/91
PC57.124		/ /	DRY TYPE DIELECTRIC PROBLEMS	A. D. KLINE		06/27/91	/ /	ANSI APPROVED 10/11/91
*C57.12.01	*GENERAL REQUIREMENTS FOR DRY-TYPE DIST. AND POWER TR INCL THOSE WITH SOLID CAST &/or RESIN-ENCAPSULATED WINDINGS				*,,,,,			

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 1

*STANDARD PROJECT	*TITLE	PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
NONE		02/02/89	NOT SPECIFIED			/ /	/ /	APP. BY SB 02/02/89
*C57.12.51	*REQ. FOR VENTILATED DRY-TYPE POWER TR, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS	*,,,,,						BALLOTTING TRANSFER TO TR COMM
NONE		12/22/80	NONE ASSIGNED			/ /	/ /	BALLOTTING REAFFIRMATION
*C57.12.52	*REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V,LV 208Y/120 TO 4160 VOLTS	*,,,,,						BALLOTTING TRANSFER TO TR COMM
NONE		12/22/80	NONE ASSIGNED			/ /	/ /	BALLOTTING REAFFIRMATION
*C57.12.55	*CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALATIONS, INCL. UNIT SUBSTATIONS	*,,,,,						BALLOTTING TRANSFER TO TR COMM
NONE		04/07/86				/ /	/ /	BALLOTTING REAFFIRMATION
*C57.12.56	*TEST PROCEDURE FOR THERMAL EVALUATION OF INSULATION SYST FOR VENTILATED DRY-TYPE POWER & DISTRIBUTION TRANSFORMERS	*,,,,,						5 YEAR REVIEW
NONE		08/27/84	THERMAL EVALUATION OF DRY-TYPE	R. L. PROVOST		/ /	/ /	SUBMIT TO SB 03/18/92
*C57.12.58	*GUIDE FOR CONDUCTING TRANSIENT VOLTAGE ANALYSIS OF A DRY- TYPE TRANSFORMER COIL	*IEC,IAS,,,,						APPROVED BY STD BOARD 6/26/91
P745		/ /	DRY TYPE DIELECTRIC PROBLEMS	A. D. KLINE		06/28/78	10/01/84	ANSI APPROVED 10/11/91
*C57.12.59	*GUIDE FOR DRY-TYPE TRANSFORMER THROUGH-FAULT CURRENT DURATION	*,,,,,						
NONE		01/01/89	DRY-TYPE THRU FAULT DUR GUIDE	NONE		09/13/84	12/19/85	ANSI APPROVED 08/09/91
*C57.12.60	*TEST PROCEDURES FOR THERMAL EVALUATION OF INSULATION SYSTEMS FOR SOLID-CAST & RESIN ENCAP POWER & DIST TRANSFORMER	*IAS,NEMA,IEC,,,						SUBMITTED TO STD BOARD
PC57.12.60		/ /	THERMAL EVALUATION OF DRY-TYPE	R. L. PROVOST		08/17/89	/ /	
*C57.12.91	*TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS	*SPD,EM,,,,						BALLOTING MAIN COMMITTEE
PC57.12.91		11/29/78	TEST CODE FOR DRY TYPE TR	D. BARNARD		06/01/89	/ /	SUBCOMM WILL BALLOT REAFFIRM
*C57.16	*REQUIREMENTS FOR CURRENT LIMITING REACTORS	*NEMA,IAS,T&D,,,						PREPARING DRAFT 5
PC57.16		09/19/58	DRY TYPE REACTORS	RICHARD DUDLEY		03/21/91	09/30/92	STANDARD WITHDRAWN
*C57.21	*REQUIREMENTS TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA	*,,,,,						COMPLETE

*STANDARD PROJECT	*TITLE PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
PC57.21	04/02/91	DRY TYPE REACTORS	RICHARD DUDLEY		/ /	/ /	ANSI APPROVED 08/09/91
*C57.94	*RECOMMENDED PRACTICE FOR INSTALLATION, APPLICATION,OPERATION & MTCE OF DRY-TYPE GEN PURPOSE DIST & POWER TR			*,,,,,			PUB. 1982, REAFFIRMED 1987
NONE	12/09/87	APPLICATION OF DRY-TYPE TR			/ /	/ /	BALLOTTING REAFFIRMATION
*C57.96	*GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			*SCC14,,,,,			
NONE	04/26/89	GUIDE FOR LOADING DRY-TYPE TR	W. H. MUTSCHLER		04/26/89	/ /	
*C57.96	*GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS			*T&D,SCC14,SCC10,,,			INCORP CAST COIL IN C57.96
PC57.96	/ /	CAST COIL LOADING GUIDE	LINDEN PIERCE		05/06/91	03/06/92	COMPLETE BY 10/93
*IEEE 259	*TEST PROCEDURE FOR EVALUATION OF SYSTEMS OF INSULATION FOR SPECIALTY TRANSFORMERS			*,,,,,			BALLOTTING TC ON REVISION
P259	06/22/72	SPECIALTY TRANSFORMERS	MAX CAMBRE		09/26/91	11/18/91	LIFE EXTENDED TO 12/92 100%
**SUBCOMMITTEE: HVACC ON HIGH VOLTAGE TR / CHAIRPERSON: / PHONE:							
*C57.12.13	*CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS			*,,,,,			BALLOTTING TRANSFER TO TR COMM
NONE	09/02/81				/ /	/ /	BALLOTTING REAFFIRMATION
**SUBCOMMITTEE: HVDC CONVERTER TR & REACTOR / CHAIRPERSON: W. N. KENNEDY / PHONE: (317)286-9387							
*C57.129	*GENERAL REQUIREMENTS & TEST CODE FOR OIL IMMERSED HVDC CONVERTER TR AND SMOOTHING REACTORS FOR DC POWER TRANSM.			*EM,T&D,PSIM,,,			REVISED PARS TO STD BOARD
PC57.129	/ /	SUBCOMMITTEE	W. N. KENNEDY		09/26/91	/ /	PD TO BE ADDED AFTER POL. REV.
*IEEE1277	*GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED AND DRY-TYPE HVDC SMOOTHING REACTORS			*,,,,,			FIRST TF MEETING TOOK PLACE
P1277	/ /	SUBCOMMITTEE			09/25/91	/ /	PAR APPROVED 09/26/91

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*STANDARD / PROJECT	*TITLE / PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
**SUBCOMMITTEE: INSTRUMENT TRANSFORMERS / CHAIRPERSON: J. N. DAVIS / PHONE: (404)393-9831							
*C57.13	*REQUIREMENTS FOR INSTRUMENT TRANSFORMERS			*PSIM,PSR,SPD,,,			SUBMIT TO REVCOM JUNE 92
P546	03/30/78	SUBCOMMITTEE			05/29/80	/ /	REQUEST EXTENSION TO 1992
*C57.13.2	*CONFORMANCE TEST PROCEDURES FOR INSTRUMENT TRANSFORMERS			*,,,,,			APPROVED BY REVCOM 12/04/91
NONE	04/16/86	SUBCOMMITTEE			09/26/91	/ /	TRANSFER TO TC APPROVED
*C57.13.4	*DET. OF PARTIAL DISCHARGE AND MEASUREMENT OF APPARENT CHARGE WITHIN INSTRUMENT TRANSFORMERS			*T&D,,,,,			D5 BEING REVIEWED
P832	/ /	SUBCOMMITTEE	A. J. JONNATTI		05/28/80	/ /	
**SUBCOMMITTEE: INSULATING FLUIDS / CHAIRPERSON: H. A. PEARCE / PHONE: (412)983-4335							
*C57.104	*GUIDE FOR THE DETECTION AND DETERMINATION OF GENERATED GAS IN OIL-IMMERSED TRANSFORMERS & THEIR RELATION TO SERVICEABIL.			*PSR,T&D,,,,			STARTED REVISING
PC57.104	06/07/78	NONE	F. W. HEINRICHS,SEC		05/31/90	/ /	ANSI APPROVED 11/20/91
*C57.106	*GUIDE FOR ACCEPTANCE AND MTCE OF INSULATING OIL IN EQUIPMENT			*NONE,,,,,			APPROVED BY STD. BOARD 6/27/91
PC57.106	06/16/78	SUBCOMMITTEE			06/19/86	/ /	ANSI APPROVED 11/20/91
*C57.111	*GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENACE IN TRANSFORMERS			*IAS,T&D,ED&PG,IEC,,			PUBLISHED
NONE	02/02/89	SUBCOMMITTEE			12/10/87	/ /	NOT AN ANSI STANDARD
*C57.121	*GUIDE FOR ACCEPTANCE AND MAINTENANCE OF LESS FLAMMABLE HYDROCARBON FLUID IN TRANSFORMERS			*PSRC,T&D,IAS,IEC,,			ANSI APPROVED 08/09/91
P954	02/22/88	SUBCOMMITTEE			04/12/82	06/10/87	
*C57.130	*GUIDE FOR THE DETECTION AND DETERMINATION OF GASES GENERATED IN OIL-IMMERSED TR DURING FACTORY TESTS			*NONE,,,,,			REQUESTING DATA FOR TABLES
PC57.130	/ /	GAS ANALYSIS DURING FACT.TESTS	J. P. KINNEY	F. W. HEINRICHS	06/01/89	05/06/91	T. F. FORMED TO CONDUCT SURVEY
*IEEE 637	*GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE			*,,,,,			REAFFIRMED 03/18/92
P637	06/04/84	SUBCOMMITTEE			/ /	/ /	

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*STANDARD / PROJECT	*TITLE	PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*IEEE 799	*GUIDE FOR HANDLING AND DISPOSING OF ASKARELS				*EIS,IAC,T&D,,,			REAFFIRMED 03/18/92
P799		11/17/86	SUBCOMMITTEE			09/27/79	/ /	
*IEEE1258	*GUIDE FOR INTERPRETATION OF GASES IN SILICONE LIQUID FILLED TRANSFORMERS				*T&D,SCC14,,,,			PAR APPROVED BY SB 12/05/91
P1258		/ /	GUIDE FOR GAS ANALYSIS-SILICON	JIM GOUDIE		12/05/91	/ /	SURVEY CONDUCTED

**SUBCOMMITTEE: INSULATION LIFE / CHAIRPERSON: D. H. DOUGLAS / PHONE: (216)447-3370

*C57.100	*TEST PROCEDURE FOR THERMAL EVALUATION OF OIL-IMMERSED DISTRIBUTION TRANSFORMERS				*NPE,EM,T&D,SPD,,			BALLOTTING WG AND SC
PC57.100		08/19/85	THERMAL EVALUATION	L. A. LOWDERMILK		10/20/88	03/03/92	REAFFIRMED 03/18/92
*C57.115	*GUIDE FOR LOADING MINERAL-OIL-IMMERSED POWER TR RATED IN EXCESS OF 100MVA (65 C WINDING RISE)				*,,,,,			BEING REVISED
P756		03/21/91	GUIDES FOR LOADING	D. S. TAKACH		/ /	/ /	ANSI APPROVED 01/13/92
*C57.119	*GUIDE FOR PERFORMING OVERLOAD HEAT RUNS FOR OIL IMMERSED POWER TRANSFORMERS				*SWGR,SUBS,SCC4,PSRC,IAS,EI			BALLOTING SC AND MC
P838		/ /	THERMAL TESTS	R. L. GRUBB		09/18/80	02/22/92	
*C57.12.00	*DEFINITION OF THERMAL DUPLICATE				*EM,IAS,,,,			CONDUCTING SURVEY
PC57.12.00(		/ /	PROJECT	R. L. GRUBB	R. L. GRUBB	05/31/90	/ /	INCLUDE IN 1992 REVISION
*C57.91	*GUIDE FOR LOADING MINERAL-OIL- IMMERSED TRANSFORMERS				*SUB,T&D,PSE,,,			PUB. 1/12/81, REAFFIRMED 1991
PC57.91		03/21/91	GUIDES FOR LOADING	D. S. TAKACH		06/13/85	10/18/91	
*C57.92	*GUIDE FOR LOADING MINERAL OIL-IMMERSED POWER TRANSFORMERS UP TO & INCL 100 MVA WITH 55 C OR 65 C AVE. WINDING RISE				*T&D,SUB,PSE,,,			PUB. 1/12/81, REAFFIRMED 1991
PC57.91		03/21/91	GUIDES FOR LOADING	D. S. TAKACH		06/28/85	10/18/91	TO BE COMBINED INTO C57.91
*C57.95	*GUIDE FOR LOADING LIQUID- IMMERSED STEP-VOLTAGE AND INDUCTION-VOLTAGE REGULATORS				*,,,,,			PUB. 08/19/85, REAFFIRMED 1991
NONE		03/21/91	GUIDES FOR LOADING	D. S. TAKACH		/ /	/ /	ANSI APPROVED 01/13/92

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*IEEE1276	*TRIAL-USE GENERAL REQUIREMENTS FOR LIQUID-FILLED DISTRIBUTION AND POWER TR UTILIZING HIGH TEMP SOLID INSULATING MATERIAL			*T&D,,,,,			SUBMITTING PAR
P1276	/ /	HIGH TEMPERATURE INSULATION	HEINZ FISCHER		09/25/91	/ /	WILL CONDUCT SURVEY ON HI-T M.
**SUBCOMMITTEE: NONE ASSIGNED / CHAIRPERSON: NONE ASSIGNED / PHONE:							
*C57.12.70	*TERMINAL MARKINGS AND CONNECTIONS FOR DISTRIBUTION & POWER TRANSFORMERS			*,,,,,			BALLOTTING TRANSFER TO TR COMM
NONE	12/17/86				/ /	/ /	BALLOTTING REAFFIRMATION
*C57.12.80	*TERMINOLOGY FOR POWER & DIST TRANSFORMERS			*,,,,,			REAFFIRMED 03/18/92
NONE	12/17/86				/ /	/ /	REAFFIRMED 100%, 88% RESPONSE
*C57.15	*REQ, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE AND INDUCTION VOLTAGE REGULATORS			*,,,,,			REAFFIRMED 03/18/92
NONE	03/18/87		J. H. HARLOW		06/19/86	/ /	REAFFIRMED 100%, 88% RESPONSE
**SUBCOMMITTEE: PERFORMANCE CHARACTERISTICS / CHAIRPERSON: J. W. MATTHEWS / PHONE: (301)597-6775							
*C57.105	*GUIDE FOR APPLICATION OF TRANSFORMER CONNECTIONS IN THREE-PHASE DISTRIBUTION SYSTEMS			*,,,,,			REAFFIRMATION 100% APPROVED
PC57.105	06/11/78	PROJECT	GEORGE REITTER		/ /	/ /	REAFFIRM 1992 ANSI WDN
*C57.109	*GUIDE FOR THROUGH-FAULT CURRENT DURATION			*PSR,,,,,			BALLOTTING D03 IN SC
PC57.109	08/19/85	SHORT-CIRCUIT DURATION	B. K. PATEL		06/27/91	/ /	LIFE EXTENDED TO 12/92 100%
*C57.110	*RECOMMENDED PRACTICE FOR ESTABLISHING TRANSFORMER CAPABILITY WHEN SUPPLYING NONSINUSOIDAL LOAD CURRENTS			*,,,,,			EXTENDED TO 03/23/93
PC57.110	08/21/87	PROJECT	MAX CAMBRE		/ /	/ /	REAFFIRMED 97%, 88% RESPONSE
*C57.116	*GUIDE FOR TRANSFORMERS DIRECTLTY CONNECTED TO GENERATORS			*,,,,,			APPROVED BY SB 01/03/89
NONE	01/03/89	TR DIRECTLY CONNECTED TO GEN	B. K. PATEL		/ /	/ /	NOTHING OUTSTANDING

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*STANDARD PROJECT	*TITLE PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.117	*GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS			*,,,,,			UNDER REVIEW BY FAILURE W.G.
P786	08/21/87	TRANSFORMER RELIABILITY	M. ALTMAN		/ /	/ /	EXT. LIFE SUB.TO SB 03/18/92
*C57.123	*GUIDE FOR TRANSFORMER LOSS MEASUREMENT			*,,,,,			TF WORKING
P1098	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING	RAMSIS GIRGIS	06/13/85	/ /	
*C57.125	*GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION AND ANALYSIS FOR POWER TRANSFORMERS AND SHUNT REACTORS			*T&D,ED&PG,PSE,SWGR,,			APPROVED BY STD BOARD 6/26/91
PC57.125	/ /	FAILURE ANALYSIS	M. ALTMAN		06/28/87	10/16/90	ANSI APPROVED 11/20/91
*C57.12.00	*REV. OF SECTION 5.9 REFERENCE TEMP FOR NO-LOAD LOSS			*,,,,,			BALLOTTING MAIN COMMITTEE
PC57.12.00c1	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	09/04/91	INCLUDE IN 1992 REVISION
*C57.12.00	*ADD TO SEC 9.3.1 ACCURACY REQUIREMENT FOR MEASURED LOSSES			*,,,,,			BALLOTTING MAIN COMMITTEE
PC57.12.00c2	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	09/04/91	INCLUDE IN 1992 REVISION?
*C57.12.00	*TRANSFORMER LOSS MEASUREMENT AND TOLERANCES			*,,,,,			MERGED INTO P462 (now 12.00c)
P787	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	/ /	
*C57.12.00	*LTC TAP POSITION INDICATION			*NONE,,,,,			GOING BACK TO DRAFT 2
PC57.12.00h	/ /	PROJECT	R. H. FRAZER		09/28/86	12/17/91	INCLUDE IN 1992 REVISION
*C57.12.00	*NAMEPLATE INFORMATION CHANGE DIRECTED VS NON-DIRECTED FLOW			*TBA,,,,,			CHECKING COORDINATION
PC57.12.00i	/ /	PROJECT	J. W. MATTHEWS		12/28/86	/ /	INCLUDE IN 1992 REVISION
*C57.12.00	*TABLE 16-C ROUTINE DIST TR RESISTANCE TEST			*,,,,,			SORTING OUT COORDINATION
PC57.12.00k	/ /	PROJECT	C. J. McMILLEN		03/28/87	/ /	INCLUDE IN 1992 REVISION
*C57.12.90	*SECTION 7.3 FIGURES 9 & 10 REVERSED			*,,,,,			READY
NONE	/ /	PROJECT			/ /	/ /	INCLUDE IN 1992 REVISION
*C57.12.90	*REVISION TO SEC 9 IMPEDANCE AND LOAD LOSSES			*,,,,,			BALLOTTING MAIN COMMITTEE
PC57.12.90e	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	09/05/91	INCLUDE IN 1992 REVISION

*STANDARD / PROJECT	*TITLE / PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.12.90	*REVISION TO SEC 8 NO-LOAD LOSSES & EXCITATION CURRENT			*,,,,,			BALLOTTING MAIN COMMITTEE
PC57.12.90e3	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	09/04/91	INCLUDE IN 1992 REVISION
*C57.131	*REQUIREMENTS FOR LOAD TAP CHANGERS			*EM,T&D,,,,			SC BALLOT COMPLETED
PC57.131	/ /	LTC PERFORMANCE REQUIREMENTS	T. P. TRAUB		08/17/89	12/01/91	TO HOLD SYMPOSIUM IN CLEVELAND
*C57.18.10	*REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS			*NONE,,,,,			BALLOTTING WORKING GROUP
PC57.18.10	/ /	SEMI-CONDUCTOR RECT TR	SHELDON KENNEDY		12/28/81	/ /	PAR HAS BEEN FOUND
*C57.21	*REQUIREMENTS,TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA			*EM,T&D,PSR,,,			COMPLETE
PC57.21	04/02/91	TEST CODE FOR SHUNT REACTORS	J. W. McGILL		06/09/88	03/20/90	ANSI APPROVED 08/09/91
*IEEE 638	*QUALIFICATION OF CLASS 1E TR FOR NUCLEAR POWER GENERATING STATIONS			*NPE,SUB,SC2,SCC10,,			APPROVED BY SB 03/18/92
P638	/ /	QUALIFICATION OF TR FOR 1E APP	L. W. PIERCE		10/29/90	04/27/90	NEW PAR APPROVED 12/04/90
**SUBCOMMITTEE: PSRC RELAY INPUT SOURCES / CHAIRPERSON: / PHONE:							
*C57.13.1	*GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS			*,,,,,			TRANSFER FROM PSR
NONE	08/25/87				/ /	/ /	SUBMIT REAF.TO REVCOM 03/18/92
**SUBCOMMITTEE: PSRC RELAY PRACTICES / CHAIRPERSON: / PHONE:							
*C57.13.3	*GUIDE FOR THE GROUNDING OF INSTRUMENT TR SECONDARY CIRCUITS AND CASES			*,,,,,			
NONE	01/23/87				/ /	/ /	
**SUBCOMMITTEE: UG TR & NETWORK PROTECTORS / CHAIRPERSON: P. E. OREHEK / PHONE: (201)430-7743							
*C57.12.24	*UNDERGROUND-TYPE 3-PHASE DIST- RIBUTION TRANSFORMERS,2500kVA AND SMALLER: HV,34500GrdY..& BELOW,LV,480 V AND BELOW			*T&D,IC,IAS/REP,IAC/PSE,,			REVISING DOCUMENT
PC57.12.24	05/10/88	3-PHASE UG-TYPE TRANSFORMERS	J. W. HOWARD		06/27/91	11/04/91	BALLOT TRANSFER TO TR COMM

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*C57.12.40	*REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMERSED)				*SCC14,,,,,			TRANSFER APPROVED
PC57.12.40		05/18/90	LIQUID-FILLED NETWORK TRANSFMR	E. A. BERTOLINI		12/05/91	03/10/92	REAFFIRMED 03/18/92
*C57.12.44	*STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS				*T&D,SWGR,IAS/REP,IAS/PSE,EEI,			PAR APPROVED BY STD. BOARD
PC57.12.44		/ /	SECONDARY NETWORK PROTECTORS	R. B. ROBERTSON		06/27/91	/ /	BALLOT TRANSFER TO TR COMM
*C57.12.57	*REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500kVA AND BELOW, W/HV 34500V AND BELOW,LV 216Y..AND 480Y..				*T&D,EEI/T&D,SCC14,,,			BALLOTTING TRANSFER TO TR COMM
PC57.12.57		08/15/86	DRY-TYPE NETWORK TRANSFORMERS	B. MUTT		12/05/91	/ /	REAFFIRMED 03/18/92
**SUBCOMMITTEE: WEST COAST / CHAIRPERSON: L. A. TAUBER / PHONE: (503)326-2323								
*C57.114	*SEISMIC GUIDE FOR POWER TRANSFORMERS AND REACTORS				*NPE,SUBS.,,,,			APP BY SB 02/15/90
P513		02/15/90	SIESMIC GUIDE	S. OKLU		09/06/73	07/28/88	ANSI APPROVED 08/09/91
*C57.120	*LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS				*SUB,EM,ED&PG,IAS,IEC,			APP. BY SB 09/16/91
P842		/ /	LOSS EVALUATION GUIDE	R. JACOBSEN		05/01/80	05/23/89	SENT TO C57 COMMITTEE 10/91
*C57.128	*FIRE PROTECTION OF OUTDOOR LIQUID IMMERSED POWER TRANSFORMERS				*NPE,SUB,PSR,,,			DRAFT BEING PREPARED
PC57.128		/ /	FIRE PROTECTION	DAVID SUNDIN		06/01/89	/ /	
*C57.12.11	*GUIDE FOR INSTALLATION OF OIL- IMMERSED TRANSFORMERS (10MVA & LARGER, 69-287kV RATING)				*,,,,,			TO BE REPLACED BY C57.93
PC57.93		05/09/80	CON. INSTALLATION GUIDES	D. A. GILLIES		/ /	/ /	LIFE EXTENSION TO 12/92 99%
*C57.12.12	*GUIDE FOR INSTALLATION OF OIL- IMMERSED TRANSFORMERS 345kV AND ABOVE				*,,,,,			TO BE REPLACED BY C57.93
PC57.93		05/09/80	CON. INSTALLATION GUIDES	D. A. GILLIES		/ /	/ /	LIFE EXTENSION TO 12/92 99%
*C57.93	*GUIDE FOR INSTALLATION OF LIQUID IMMERSED POWER TRANSFORMERS.				*NONE,,,,,			BALLOTING MAIN COMMITTEE
PC57.93		/ /	CONSOLIDATION OF INST. GUIDES	D. A. GILLIES		06/01/89	/ /	WITHDRAW 12.11/12.12 WHEN APP

04/16/92

STATUS REPORT OF STANDARDS C57.12.00 AND C57.12.90 IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 2

PROJECT	*TITLE YEAR	PUB DATE	SUBCOMMITTEE	SC CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION WG CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
**STANDARD:C57.12.00 RESPONSIBLE CHAIRPERSON: W. B. BINDER PHONE: (216)384-5625 FAX: (216)384-5014								
VARIOUS	*GEN REQ. FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS 1987	03/20/87	ASSIGNED TO MANY SUBCOMM.	MANY	*,,,,,	/ /	/ /	CONSOLIDATING CHANGES FOR 1992 SUBMIT REVISIONS BY MAY, 1992
P787	*TRANSFORMER LOSS MEASUREMENT AND TOLERANCES 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*,,,,, W. R. HENNING	06/28/79	/ /	MERGED INTO P462 (now 12.00c)
PC57.12.00c1	*REV. OF SECTION 5.9 REFERENCE TEMP FOR NO-LOAD LOSS 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*,,,,, W. R. HENNING	06/28/79	09/04/91	BALLOTTING MAIN COMMITTEE INCLUDE IN 1992 REVISION
PC57.12.00c2	*ADD TO SEC 9.3.1 ACCURACY REQUIREMENT FOR MEASURED LOSSES 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*,,,,, W. R. HENNING	06/28/79	09/04/91	BALLOTTING MAIN COMMITTEE INCLUDE IN 1992 REVISION?
PC57.12.00h	*LTC TAP POSITION INDICATION 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*NONE,,,,, R. H. FRAZER	09/28/86	12/17/91	GOING BACK TO DRAFT 2 INCLUDE IN 1992 REVISION
PC57.12.00i	*NAMEPLATE INFORMATION CHANGE DIRECTED VS NON-DIRECTED FLOW 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*TBA,,,,, J. W. MATTHEWS	12/28/86	/ /	CHECKING COORDINATION INCLUDE IN 1992 REVISION
PC57.12.00j	*NEW SEC 6.8 MINIMUM EXTERNAL CLEARANCES BETWEEN LIVE PARTS 0	/ /	DIELECTRIC TESTS	H. R. MOORE	*,,,,, R. A. VEITCH	12/28/86	/ /	COMPLETE INCLUDE IN 1992 REVISION
PC57.12.00k	*TABLE 16-C ROUTINE DIST TR RESISTANCE TEST 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*,,,,, C. J. McMILLEN	03/28/87	/ /	SORTING OUT COORDINATION INCLUDE IN 1992 REVISION
PC57.12.00l	*DEFINITION OF THERMAL DUPLICATE 0	/ /	INSULATION LIFE	D. H. DOUGLAS	*EM,IAS,,,, R. L. GRUBB	05/31/90	/ /	CONDUCTING SURVEY INCLUDE IN 1992 REVISION

04/16/92

STATUS REPORT OF STANDARDS C57.12.00 AND C57.12.90 IEEE/PES TRANSFORMERS COMMITTEE

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**STANDARD:C57.12.90 RESPONSIBLE CHAIRPERSON: G. H. VAILLANCOURT PHONE: (514)652-8515 FAX: (514)652-8555

PROJECT	*TITLE YEAR	PUB DATE	SUBCOMMITTEE	SC CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION WG CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
VARIOUS	*STANDARD TEST CODE FOR LIQUID- IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF 1987	03/18/87	ASSIGNED TO MANY SUBCOMM.	MANY	*,,,,,	/ /	/ /	CONSOLIDATING CHANGES FOR 1992 SUBMIT REVISIONS BY MAY, 1992
NONE	*SECTION 7.3 FIGURES 9 & 10 REVERSED. 1987	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*,,,,,	/ /	/ /	READY INCLUDE IN 1992 REVISION
PC57.12.90b	*TRANSFORMER SOUND POWER MEASUREMENT 0	/ /	AUDIBLE SOUND & VIBRATION	A. M. TEPLITSKY	*EM,NEMA,,,, A. M. TEPLITSKY	03/01/86	/ /	APPROVED BY MAIN COMMITTEE INCLUDE IN 1992 REVISION
PC57.12.90c	*ROUTINE IMPULSE TESTS FOR DISTRIBUTION TRANSFORMERS 0	/ /	DIELECTRIC TESTS	H. R. MOORE	*RMC,PSC,,,, JOHN ROSETTI	09/10/87	/ /	MAIN COMMITTEE BALLOT COMPLETE INCLUDE IN 1992 REVISION
PC57.12.90d	*ENHANCEMENT VOLTAGE TIME DURATION DURING POWER TRANSFORMER INDUCED TESTS 0	/ /	DIELECTRIC TESTS	H. R. MOORE	*,,,,, J. B. TEMPLETON	09/28/90	/ /	DRAFT 1 BEING PREPARED
PC57.12.90e	*REVISION TO SEC 9 IMPEDANCE AND LOAD LOSSES 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*,,,,, W. R. HENNING	06/28/79	09/05/91	BALLOTTING MAIN COMMITTEE INCLUDE IN 1992 REVISION
PC57.12.90e3	*REVISION TO SEC 8 NO-LOAD LOSSES & EXCITATION CURRENT 0	/ /	PERFORMANCE CHARACTERISTICS	J. W. MATTHEWS	*,,,,, W. R. HENNING	06/28/79	09/04/91	BALLOTTING MAIN COMMITTEE INCLUDE IN 1992 REVISION

04/16/92

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

ACRONYM	SOCIETY/COMMITTEE	LIAISON REPRESENTATIVE	PHONE NUMBER
AIM/TSC	AUTOMATIC IDENTIFICATION MANUFACTURERS (TSC COMM.)		
ED&PG	ENERGY DEVELOPMENT AND POWER GENERATION COMMITTEE	C. A. LENNON JR.	(702) 293-8817
EEI	EDISON ELECTRIC INSTITUTE (T&D COMM.)	M. C. MINGOIA	(202) 508-5177
EI	ELECTRICAL INSULATIONS	R. J. FLAHERTY, JR.	(301) 820-7027
EM	ELECTRIC MACHINERY COMMITTEE	B. GUPTA	(413) 231-4111
IAS	INDUSTRY APPLICATION SOCIETY	B. C. JOHNSON	(512) 396-5880
IAS/PSE	IAS/POWER SYSTEM ENGINEERING COMMITTEE	R. W. INGHAM	(313) 236-0130
IAS/REP	IAS/RURAL ELCTRIC POWER COMMITTEE	C. HERTZ	(217) 563-8333
IC	INSULATED CONDUCTORS COMMITTEE	F. E. KIMSEY	(704) 373-6562
IEC	INTERNATIONAL ELECTROTECHNICAL COMMISSION	R. S. GIRGIS	(317) 286-9532
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION	J. GAUTHIER	(202) 457-8400
NPE	NUCLEAR POWER ENGINEERING COMMITTEE	A. R. ROBY	(203) 665-3157
PSC	POWER SYSTEM COMMUNICATIONS COMMITTEE	S. BOGDANOWICZ	(201) 761-1818
PSE	POWER SYSTEM ENGINEERING COMMITTEE	R. BEDNARIK	(212) 580-6675
PSIM	POWER SYSTEM INSTRUMENTATION MEASUREMENT COMMITTEE	T. R. MC COMB	(613) 990-5826
PSRC	POWER SYSTEM RELAYING COMMITTEE	A. G. PHADKE	(703) 231-7029
SCC14	COORD. COM. ON QUANTITIES UNITS AND LETTER SYMBOLS	B. BARROW	(703) 285-5444
SCC4	COORDINATING COMMITTEE ON THERMAL RATING	P. E. ALEXANDER	(219) 458-4576
SPD	SURGE PROTECTIVE DEVICES COMMITTEE	J. B. POSEY	(216) 335-2361
SUBS	SUBSTATIONS COMMITTEE	J. E. HOLLADAY	(615) 689-5781
SWGR	SWITCHGEAR COMMITTEE	D. M. LARSON	(203) 634-5739
TC	TRANSFORMERS COMMITTEE	G. H. VAILLANCOURT	(514) 652-8515
TSC	TECHNICAL SYMBOLOGY COMMITTEE (PART OF AIM)		
T&D	TRANSMISSION AND DISTRIBUTION COMMITTEE	F. D. MYERS	(314) 682-8401

04/16/92

COORDINATION ACTIVITIES OF THE IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 4

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

04/16/92

COORDINATION ACTIVITIES OF THE IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 4

*PROJECT NUMBER AND TITLE	DATE	RESPONSIBLE COMMITTEE	CONTACT IN RESP. COMM.	CONTACT PHONE NO.	TRANSFORMERS COMMITTEE COORDINATOR	TRANSFORMERS COMMITTEE SUBCOMMITTEE	COORDINATOR PHONE NO.
*C37 GUIDE FOR PARTIAL DISCHARGE MEASUREMENTS IN SWITCHGEAR	10/22/91	SWGR	MIRIAM P. SANDERS	919-851-8770	GEORGE VAILLANCOURT	DIELECTRIC TESTS	514-652-8515
*PXXXX GUIDE FOR STATIC VAR COMPENSATOR FIELD TESTS	01/10/92	SUBS	PHILIP R. NANNERY	914-577-2591	R. F. DUDLEY	DRY TYPE	416-298-8108
*P1030.3 GUIDE FOR SPECIFICATION OF HVDC PERFORMANCE - PART III, DYNAMIC PERFORMANCE	08/19/91	T&D	CLIFFORD C. DIEMOND	503-222-2109	WILLIAM N. KENNEDY	HVDC CONV. TR & SMOOTHING REAC	317-286-9387
*PC37.97 GUIDE FOR PROTECTIVE RELAY APPLICATION TO POWER SYSTEM BUSES	12/10/87	PSR	STEVE CONRAD	505-848-2642	JOHN N. DAVIS	INSTRUMENT TRANSFORMERS	404-393-9831
*PC37.110 GUIDE FOR THE APPLICATION OF CURRENT TRANSFORMERS USED FOR PROTECTIVE RELAYING PURPOSES	05/31/90	PSR	L. J. SHULZE	312-255-5760	JOHN N. DAVIS	INSTRUMENT TRANSFORMERS	404-393-9831
*PC57.13.1 GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS	/ /	PSR	D. R. VOLZKA	414-221-2750	JOHN N. DAVIS	INSTRUMENT TRANSFORMERS	404-393-9831
*NEW CURRENT MEASURING SYSTEMS WHICH USE OPTICAL TECHNIQUES	01/31/92	PSIM	TERRY McCONB	613-990-5826	J. N. DAVIS	INSTRUMENT TRANSFORMERS	404-393-9831
*P55 TEMPERATURE CORRELATION OF INSULATED CABLE CONNECTED TO ELECTRICAL EQUIPMENT	10/30/81	IC	FRED KIMSEY		L. J. SAVIO	INSULATION LIFE ?	212-460-4187
*P1257 GUIDE FOR DIAGNOSTICS AND FAILURE INVESTIGATION OF POWER CIRCUIT BREAKERS	05/01/91	SWGR	L. ROLANDO SAAVEDRA	504-363-8765	WALLACE B. BINDER JR.	PERFORMANCE CHARACTERISTICS	216-384-5625
*PC37.91 GUIDE FOR PROTECTVE RELAY APPLICATION TO POWER TRANSFORMERS	/ /	PSR	R. J. FERNANDEZ	215-770-5619	B. K. PATEL	PERFORMANCE CHARACTERISTICS	205-877-7740
*NEW GUIDE FOR THE COMMISSIONING OF ELECTRICAL SYSTEMS IN HYDROELECTRIC POWER PLANTS	07/26/90	ED&PG	LOUIS A. TAUBER	503-326-2323	D. A. GILLIES	WEST COAST	503-622-4847

04/16/92

COORDINATION ACTIVITIES OF THE IEEE/PES TRANSFORMERS COMMITTEE

ATTACHMENT 4

*PROJECT NUMBER AND TITLE	DATE	RESPONSIBLE COMMITTEE	CONTACT IN RESP. COMM.	CONTACT PHONE NO.	TRANSFORMERS COMMITTEE COORDINATOR	TRANSFORMERS COMMITTEE SUBCOMMITTEE	COORDINATOR PHONE NO.
*NEW GUIDE FOR INSTALLING TEMPORARY SUBSTATIONS	03/30/91	SUBS	SHASHI G. PATEL	404-362-5386	D. A. GILLIES	WEST COAST	503-622-4847
*P979 GUIDE FOR SUBSTATION FIRE PROTECTION	01/10/92	SUBS	A. J. BOLGER	604-663-2879	D. W. SUNDIN	WEST COAST	414-524-3221

IEEE

TRANSFORMERS COMMITTEE

POWER ENGINEERING SOCIETY

Please Reply To:

RECOGNITION & AWARDS SUBCOMMITTEE REPORT FOR THE TRANSFORMERS COMMITTEE MEETING
April 1st, 1992

The following Awards and Certificates of Appreciation will be presented at the Transformers Committee Meeting held in Birmingham, AL, April 1st, 1992.

(a) 1992 Transformers Committee Prize Paper Award
Presented to Linden W. Pierce for his paper, "An Investigation of the Thermal Performance of an Oil-Filled Transformer".

(b) 1992 Transformers Committee Award for Outstanding Working Group
Presented to Bipin K. Patel, Working Group Chairman, for their document "IEEE C57.116, Guide for Transformers Directly Connected to Generators".

This working group had the following membership:

Bipin K. Patel - Chairman
J. M. Pollitt - Secretary
~~J. B. Boset~~
D. H. Douglas
J. A. Ebert
C. R. Hoesel, II
B. G. Hunter
C. Hurty
E. W. Kalkstein
E. Koenig
J. G. Lackey
L. R. Stensland
H. J. Windisch
D. A. Yannucci

This guide was also submitted to PES, in competition with six other standards and guides, for the PES Working Group Recognition Award. Although it did well in the balloting, another guide won this award.

(c) Certificate of Appreciation
These certificates are presented to individuals who have been former Chairmen of the Transformers Committee, Subcommittees and Working Groups. The following certificates are being presented:

Wallace B. Binder - Standards Subcommittee
Joseph B. Bonucchi - Recognition & Awards Subcommittee
Don Kline - Working Group - Dry Type Dielectric Problems
Egon Koenig - Working Group - Test Code PC57.12.91
Jack McGill - Working Group - Test Code for Shunt Reactors
Harold R. Moore - Working Group - Revision of Dielectric Tests

Cont'd.....2

IEEE

TRANSFORMERS COMMITTEE

POWER ENGINEERING SOCIETY

Please Reply To:

Bipin K. Patel - Working Group - Transformers Directly Connected to Generators
Len Stensland - Working Group - Qualification of Transformers for Class 1E Application in Nuclear Power Stations
Robert Veitch - Transformers Committee

Respectfully Submitted,

Robert A. Veitch

RAV:SH

TRANSFORMERS COMMITTEE

CHAIRMAN'S REPORT
TRANSFORMERS COMMITTEE MEETING
Birmingham, Alabama
March 29–April 1, 1992

IEEE PES TECHNICAL COUNCIL

The Technical Council (TC) met on January 28, 1992 at the IEEE PES Winter Power Meeting in New York; highlights are as follows:

- Chairman Jerry Hagge noted that ANSI has given notice of intent to withdraw C92.1 on insulation coordination on April 30, 1992 unless action is taken prior to that date. The Chairman noted that the IEEE and Technical Council were willing to take responsibility for the document but were presently unsure as to the proper home. Jim Edmonds moved that TC sponsor C92.1 as an IEEE standard to prevent the document from being withdrawn; seconded by Steve Whisenant. Motion approved.

- The Chairman then appointed an adhoc TF consisting of S.R. Lambert, Chairman, J.G. Anderson, C. Wagner, R. Heilman and W. Elmore to 1) prepare/submit a PAR in the name of the TC and 2) prepare and submit a recommended organizational structure to support the work within the TC. The TF is to report at the Summer Meeting with a recommendation by the next Winter Meeting.

- The Chairman noted that the PSRC had celebrated their 75th anniversary.

- Technical Paper Quotas (Mike Holm) – Mike expressed concern pointing out that their quota limit was causing them to reject some 50% of the submitted papers, and indicated that because the quotas were based on last year's acceptances that there was no mechanism for change. Don Volzka responded by explaining the present approach and oted that there were always going to be inequities. He explained that the present system uses a five year rolling average to set the quotas. Further discussion was held off until the Publications Committee report.

- Neural Networks (Clark Gellings) – Clark moved that the TC recommend to the Executive Board that the PES join the Neural Network Council (seconded by Peter Lewis). Clark discussed the sharing in surplus and deficits. Motion passed.

- International Joint Power Generation Conference (JPGC) (Jim Edmonds) – Jim noted the IEEE had jointly sponsored the JPGC along with ASME and some other groups. The PES IJPGC liaison committee recommends that the TC adopt a long range plan to enhance and increase PES participation (moved by Jim and seconded by Pete Lewis). Jim noted that at the last meeting (San Diego) IEEE

sessions were not well attended while joint IEEE/ASME sessions were and that these joint sessions were being encouraged. After a lengthy discussion, the motion passed.

- IEC (John Zulaski) – John indicated that IEC is interested in adopting some IEEE relay standards. Andy Salem indicated that such an adoption is acceptable and that IEEE will release our copyright. The procedure would be to identify the specific standard and notify the IEEE Standards Board.

- Meetings – Walt Ros noted that the move of the Winter Meeting to the Hilton was well accepted. The T&D meeting was a resounding success. Walt mentioned that we are co–sponsoring a meeting in Athens, Greece, for 1993. Walt repeated the need for coordination of technical committee meetings with the T&D meeting suggesting meeting either immediately before or after the conference. Discussion which followed indicated a reluctance by the technical committees to have their people away from their work for two weeks at a stretch. The Chair recognized the problem and requested that the committees give consideration to the problem.

- Organization and Procedures (Jim Edmonds)

  Jim reported on the latest ballot on the O&P manual which was approved and indicated that the TC will be balloted on the manual.

- Publications (Don Volzka)

  Don expressed dissatisfaction with the fact that some of the panel sessions still had been printed with "panelists to be announced". While noting that there were some paperwork problems, this needs to be properly handled.

  There still remains a problem with scheduling committee meetings in parallel with the Monday morning plenary session.

  Considerable discussion ensued on publications problems. The Chairman appointed Don to head an adhoc committee to review the present process and determine methods which provide needed improvements. Report due at the 1992 Summer Meeting.

- Technical Sessions Improvement (John Boyle)

  John reported that Guidelines for Slides and Overheads were being included in the author's kit and pointed out that the document indicates that the author's paper can be withheld from publication if the visuals do not meet IEEE standards.

  John also reported on the Technical Sessions Guide for Session Chairmen. Some of the new items addressed give a chairman more power than previously in that he is to verify that the presenters are prepared for their presentation and that the

session chairman has the authority to cancel a presentation if the presenter is not prepared or qualified.

John presented the author's evaluation sheet and discussed its use and application. He discussed the various options being considered to deliver the evaluation information back to the authors. A number of alternatives were discussed with the suggestion being that the author write their name and address on the evaluation form during the author's breakfast. Following the session, Nancy Heitmann would be responsible for collecting the sheet and adding the stamp. The sheets would then be sent in mass to John for analysis; he would then send them out.

John D. Borst
Chairman IEEE Transformers Committee

AUDIBLE SOUND & VIBRATION SUBCOMMITTEE

March 30, 1992

AS&V Subcommittee currently has 15 voting members.

C57.12.90: Test Code for Liquid-Immersed Distribution Power and Regulation Transformers, Section 13, Audible Sound Emissions.

As previously reported, this revision has been approved by the Transformers Committee with negative ballots resolved. Some confusion developed concerning coordination, which has been, resolved and coordination and final submittal to the IEEE Standards Board is imminent..

P523/C57-112: Guide for the Control of Transformer Sound.

Currently undergoing discussion and review by the task force. May submit a new PAR as the existing P & R is quite old and final direction of this effort is not fully known.

NEMA TR1: (Obsolete) Audible Sound Levels for Oil-Immersed Power Transformers.

We are investigating possible inclusion of this table in an updated version as an IEEE or ANSI standard.

(5371h)

IEEE PES TRANSFORMERS COMMITTEE
ADMINISTRATIVE SUBCOMMITTEE
MARCH 30, 1992 - BIRMINGHAM, AL

1. SUBCOMMITTEE MEMBERSHIP - 31 Members

Seven members were added at the Baltimore Meeting. One member requested to be drop due to retirement.

1.1 NOMINATIONS TO TRANSFORMERS COMMITTEE

- Sullivan, John C. Tampa Electric

2. WORKING GROUPS - ACTIVE

2.1 WG DRY TYPE REACTORS - C57.16

Draft D4 incorporating the changes from the Baltimore meeting is complete and will be discussed at these meetings.

2.2 TF DRY TYPE HVDC SMOOTHING REACTORS - IEEE 1277

The first meeting of this TF will be held at this session.

2.3 WG DRY TYPE TEST CODE - C57.12.91

Draft D4 was completed and will be discussed at this session.

2.4 WG CAST COIL LOADING GUIDE - C57.96

Draft D1 was completed since the last meeting and will be discussed during these sessions.

2.5 WG SPECIALTY TRANSFORMERS - IEEE 259

Draft D8 was balloted by the Transformers Committee. Results from the ballot will be discussed at this session. The PAR for this WG expires 12/92.

2.6 WG THERMAL EVALUATION - CAST COILS - C57.12.60

Draft D9 was submitted to the Standards Board. It's status will be report at this meeting.

3. OTHER STANDARDS ACTIVITY

3.1 C57.12.50 - CONFORMANCE STANDARD ≤ 500 KVA

This standard was balloted for transfer from ANSI and reaffirmation following the Baltimore meetings.

Transfer was approved unanimously.

One negative was received on reaffirmation. The objection was that due to the age of the document (10 years) it should be thoroughly reviewed in light of current practices. This will be a topic at the Subcommittee meeting.

3.2 C57.12.51 - CONFORMANCE STANDARD > 500 KVA

This standard was balloted for transfer from ANSI and reaffirmation following the Baltimore meetings.

There was one negative vote for transfer. This is still an unresolved negative.

One negative was received on reaffirmation which was the same as on C57.12.50 and will be discussed at the Dry Type Subcommittee meeting.

3.3 C57.12.52 - CONFORMANCE STANDARD SEALED DRYS

This standard was balloted for transfer from ANSI and reaffirmation following the Baltimore meetings.

There was one negative vote for transfer. This is still an unresolved issue.

One negative was received on reaffirmation which was the same as on C57.12.50 and will be discussed at the Dry Type Subcommittee meeting.

3.4 C57.12.55 - CONFORMANCE STANDARD UNIT SUBSTATIONS

This standard was balloted for transfer from ANSI and reaffirmation following the Baltimore meetings.

There were two negative votes for transfer. One was the same as the C57.12.50 negative. The other was different in that the individual felt the standard was not a "transformer" standard. This negative has been withdrawn. See the attached for a formal declaration of the withdrawal.

Two negative votes were also received on the reaffirmation vote. One was the same as C57.12.50 (age of document). The other was from the same individual who was negative on the transfer due to its not being a "transformer" document and has been withdrawn. See the attached for a formal declaration of the withdrawal.

3.5 C57.12.56 - DRY TYPE THERMAL EVALUATION

This standard is due for a reaffirmation vote. It will be a subject of discussion at the WG meeting on Cast Coil Thermal Evaluation on Tuesday.

3.6 C57.94 - INSTALLATION GUIDE

This standard is due for reaffirmation vote in 1992. See attached letter formally requesting a reaffirmation vote.

3.7 C57.99 - DRY TYPE REACTOR LOADING GUIDE

This standard, an appendix to C57.16, is due for reaffirmation in 1991. The WG Dry Type Reactors which is currently rewriting C57.16 has recommended that C57.99 be allowed to expire. This position was confirmed at the Baltimore meeting of the Dry Type Subcommittee. See the attached letter with a formal request to this effect.

3.8 C57.12.91 - DRY TYPE TEST CODE

This document is due to expire. While a WG is currently active on its revisions it is unlikely that the revisions will be completed in time to prevent expiration of C57.12.91 - even with a two year extension. The WG Chairman, Mr. Barnard, has requested the IEEE Standards Board to initiate a reaffirmation vote in the TRANSFORMERS COMMITTEE. Per the attached letter I wish to also make such a request.

Wesley F. Patterson Jr - Chairman
Dry Type Transformer Subcommittee

ABB ASEA BROWN BOVERI
ABB POWER T&D COMPANY INC.
Dry Type Transformer Division
State Route 42, P.O.Box 38, Bland, VA 24315
Telephone: 703-688-3325
Telefax : 703-688-4588

TO: IEEE TRANSFORMER COMMITTEE
ATTN: Mr. John Borst - Chairman
FAX: 314-634-7823

DATE: March 27, 1992
FROM: Wes Patterson
PAGES:

REF: IEEE C57.94 - REQUEST FOR REAFFIRMATION BALLOT

COPY:			
	Jim Harlow	Vice Chairman	813-546-0121
	Wally Binder	Secretary	216-384-5017
	George Vaillancourt	Chairman - StdSubCom	514-652-8555
	Sue Vogel	IEEE Stds Brd	908-562-1571

Gentlemen:

Please initiate the process to have C57.94 balloted in the TRANSFORMERS COMMITTEE for reaffirmation.

Thank you.

Wesley F. Patterson Jr. - Chairman
Dry Type Transformer Subcommittee

ABB ASEA BROWN BOVERI
ABB POWER T&D COMPANY INC.
Dry Type Transformer Division
State Route 42, P.O.Box 38, Bland, VA 24315
Telephone: 703-688-3325
Telefax : 703-688-4588

TO: IEEE TRANSFORMER COMMITTEE
ATTN: Mr. John Borst - Chairman
FAX: 314-634-7823

DATE: March 27, 1992
FROM: Wes Patterson
PAGES:

REF: IEEE C57.12.55 - WITHDRAWAL OF NEGATIVE BALLOTS BY D.FALLON

COPY:			
	Jim Harlow	Vice Chairman	813-546-0121
	Wally Binder	Secretary	216-384-5017
	George Vaillancourt	Chairman:Std Sub Com	514-652-8555
	Sue Vogel	IEEE Stds Brd	908-562-1571
	Donald Fallon	Public Service E&G	201-621-2150

Gentlemen:

Mr. Fallon's negative ballots on both the transfer of this document from ANSI to IEEE and the reaffirmation of the document were based on the fact the the document is primarily an "enclosure" document.

Following an explanation of the history of C57.12.55, its lack of fit into other standards organizations, and its current usage within the dry type industry, Mr. Fallon has agreed to withdrawal his negative ballot on both issues.

Thank you.

Wesley F. Patterson Jr. - Chairman
Dry Type Transformer Subcommittee

ABB ASEA BROWN BOVERI
ABB POWER T&D COMPANY INC.
Dry Type Transformer Division
State Route 42, P.O.Box 38, Bland, VA 24315
Telephone: 703-688-3325
Telefax : 703-688-4588

TO: IEEE TRANSFORMER COMMITTEE
ATTN: Mr. John Borst - Chairman
FAX: 314-634-7823

DATE: March 27, 1992
FROM: Wes Patterson
PAGES:

REF: IEEE C57.12.91 - BALLOT FOR REAFFIRMATION

COPY:	Jim Harlow	Vice Chairman	813-546-0121
	Wally Binder	Secretary	216-384-5017
	George Vaillancourt	Chairman:Std Sub Com	514-652-8555
	Dave Barnard	Chairman:WG C57.12.91	416-298-2209
	Sue Vogel	IEEE Stds Brd	908-562-1571

Gentlemen:

Please initiate the process to have C57.12.91 balloted in the TRANSFORMERS COMMITTEE for reaffirmation.

Note that there is an active working group addressing revisions to this document. Unfortunately this WG will not be able to complete its activity before the expiration of C57.12.91 - even with a two year extension. As this is an essential document in the industry, it is important that the document not be allowed to expire.

Thank you.

Wesley F. Patterson Jr. - Chairman
Dry Type Transformer Subcommittee

ABB ASEA BROWN BOVERI
ABB POWER T&D COMPANY INC.
Dry Type Transformer Division
State Route 42, P.O.Box 38, Bland, VA 24315
Telephone: 703-688-3325
Telefax : 703-688-4588

TO: IEEE TRANSFORMER COMMITTEE
ATTN: Mr. John Borst - Chairman
FAX: 314-634-7823

DATE: March 27, 1992
FROM: Wes Patterson
PAGES:

REF: IEEE C57.99 - 1992 EXPIRATION

COPY:		
Jim Harlow	Vice Chairman	813-546-0121
Wally Binder	Secretary	216-384-5017
George Vaillancourt	Chairman - StdSubCom	514-652-8555
Richard Dudley	Chairman - WG Reactors	416-298-2209
Sue Vogel	IEEE Stds Brd	908-562-1571

Gentlemen:

Following discussions at both the Dry Type Subcommittee and the WG Dry Type Reactors, both groups agreed that this document should be allowed to expire as it is no longer consistent with current practice. Note that the WG Dry Type Reactors is currently reworking C57.16 and that C57.99 is an appendix to C57.16. This WG intends to pursue a complete rewrite of the loading guide when the work on C57.16 is completed.

Thank you.

Wesley F. Patterson Jr. - Chairman
Dry Type Transformer Subcommittee

INSULATING FLUIDS SUBCOMMITTEE

The Insulating Fluids Subcommittee will spend most of the time in Birmingham working on PC57.130, Guide for Gas Analysis During Factory Test, and P1258, Guide for Gas Analysis of Transformers Filled with Silicone Fluid.

C57.104, Oil Guide, and C57.106, Gas Guide, are being edited at the present time and will be ready for printing in the near future.

Henry Pearce
Chairman
3-31-92

DIELECTRIC TESTS SUBCOMMITTEE ACTIVITIES

ADMINISTRATIVE SUBCOMMITTEE 3/30/92

1. MEMBERSHIP

The present membership is 72, and 7 additional persons have requested membership in the subcommittee.

2. STANDARDS ACTIVITIES

- The "Trial Use Guide for Measurement of Acoustic Emissions" was lost some time ago by the Standards Office, and the ruling was that it must be balloted again. However, the ballots have not been mailed. Mr. Vaillancourt is investigating this matter and will determine actions needed to have this matter resolved.

- The Task Force on the Measurement of Apparent Charge has completed its tasks and had been terminated. It was decided that the new Task Force on acceptance criteria for partial discharges would not be formed. This effort will be conducted by the Working Group on Revision of Dielectric Tests.

- The efforts on the revision of C57.98 "IEEE Guide for Transformer Impulse Tests" are continuing. Another revision of the new portion on switching impulse testing was balloted, and the only negatives were on issues that had not been previously proposed on other ballots. An attempt is now being made to resolve these issues. The new section on digital recording is complete. Various clarifications have been prepared.

- The Working Group on Revision of Dielectric Tests for Distribution Transformers continues to work on the low side surge requirements and the "Routine Impulse Test Guide for Distribution Transformers". The directions to take on the low side surge requirements is not clear, and the Working Group will attempt to resolve this issue at the Birmingham meeting.

3. LIAISON ACTIVITIES

As the result of actions taken at the Baltimore Administrative Subcommittee and Dielectric Tests Subcommittee meetings, a Task Force is being organized by the Working Group on Revision of Dielectric Tests to study the question of metal oxide arrester impact on transformer insulation coordination. Although the initial liaison group study organized by Loren Wagenaar did not reveal any problems, it was decided that a task force should consider the various aspects of this question. This task force is expected to be organized by the fall meeting.

Harold Moore

Harold R. Moore
March 22, 1992

IEEE/PES TRANSFORMERS COMMITTEE
INSTRUMENT TRANSFORMERS SUBCOMMITTEE
Birmingham, Ala.

March 30, 1992

1. Submission of the revised C57.13-19xx, "Requirements for Instrument Transformers", to the IEEE Standards Board has been delayed by a misunderstanding of the balloting procedure of the IEEE standards office. The original procedure required the sub-committee chairman to ballot the representative(s) of a committee(s) with whom coordination was required by the original PAR. The subcommittee chairman thought that their balloting was a part of the same procedure for balloting the sponsoring committee. This was resolved by the recent revision of the part of the IEEE standards office in balloting committees. The coordinators have now been balloted. The Switchgear Committee representative did not approve the proposed document. Negotiations are in progress to persuade him to change his ballot to 'no objection'.

1.1 Required insulation levels has been the biggest stumbling block (source of negative votes) in obtaining approval of C57.13. The question of partial discharge testing is the next obstacle. However, manufacturer's representatives on the committee have not been aware of any undue problems. Our open discussion at the Washington, D.C. meeting did not result in any overwhelming request for changes in the published or the proposed documents.

2. The subcommittee has not received any communication from EPRI concerning instrument transformer field failures. The conference held by EPRI almost two years ago with some users has not produced any useful information for evaluation of published and/or proposed insulation levels.

3. The subcommittee will continue its work on the draft of the proposed guide, "Detection of Partial Discharges and the Measurement of Apparent Charged Within Instrument Transformers".

John N. Davis
Chairman, Instrument Transformer Subcommittee

WEST COAST TRANSFORMER SUBCOMMITTEE

- Previous meeting minutes submitted by Len Swenson in Baltimore.

- Next meeting in Durango, Colorado, with WAPA; presentation on phase shifting transformers.

- West Coast Transformer Subcommittee will host the spring 1993 Transformers meeting in Portland, Oregon, March 28-31, 1993, at the Lloyd Center Red Lion. Preliminary indication of room costs will be $100/night single, $115/double.

- Standards:

  1) Standard on Loss Evaluation - Spoke to Roger Jacobsen -- a standards editor was to have been assigned, but as of Saturday, 3/28, he had heard nothing.

  2) Standard on Insulation Guide Consolidation - Will ballot Main Committee within two months from now.

Lou Tauber
3/30/92

Notes for the Administrative Subcommittee Meeting -
Monday, March 30, 1992

For - Matt Mingoia

Subcommittee Reports

Distribution Transformers Subcommittee

As an initial report of the Distribution Transformer Subcommittee, regretfully, we wish to report the resignation of Mr. Frank Stevens, from the Chairman's position. Frank has graciously given much of his time throughout his association with the ANSI Standards committee. His untiring effort enabled the Distribution Transformer group the opportunity to join the ranks of IEEE. Recognizing the need to provide continuity within the Subcommittee, Mr. Jerry Thompson will, in October 1992, assume the responsibilities of the Distribution Transformer Subcommittee Chairman. The many years experience that Jerry Thompson brings with him to the position will assure a continuation of the functional activities of the group. This Spring meeting has a total of (6) working groups scheduled to have sessions. Those meetings are:

- Overhead Type Transformers (C57.12.20)
- Single Phase Dead Front Padmounts (C57.12.25)
- Three Phase Dead Front Padmounts (C57.12.26)
- Three Phase Live Front Padmounts (C57.12.22)
- Single Phase Live Front Padmounts (C57.12.21)
- Bar Coding Working Group

Both C57.12.23 and C57.12.26 have been balloted at the Main Committee. Information has been received that C57.12.23 has been approved by the IEEE Standards Board. C57.12.26 which when balloted had (4) negative votes, has now been cleared of all negative ballots. At this time, the required documentation for submittal to IEEE Standards Board is being completed.

The joint Working Group C/57/37 on Enclosure Integrity held a meeting on February 25 and 26, 1992 at the facilities of Potomac Electric Power Co. Concern was voiced again about the non attendance of the NEMA secretariat for the fourth consecutive meeting.

A review of Draft 5 of ANSI C57.12.30, Standard for Enclosure Integrity of Submersible Equipment, was accomplished in this meeting. Areas covered and discussed in detail such as Impact Tests, Weathering Test, QUV exposure and pass/fail criteria as applicable to Submersible Equipment, dominated the 2 day session.

A first hand view of the corrosion problems facing PEPCO was available to the group members wishing to visit actual equipment installations.

With the resignation of Mr. Frank Stevens, as the Chairman of the Enclosure Integrity Working Group, acting Chairman J. Martin of Consolidated Edison, devoted discussion time to the future activities of this Working Group. Further discussion concerning the moving of the C57/37 Enclosure Integrity Working Group to the IEEE Distribution Transformer Subcommittee will be held at the Birmingham meeting.

The next meeting of the C57/37 Working Group has been tentatively planned for June of 1992, in Buffalo, New York.

Respectfully submitted,

G. Paiva for
Frank Stevens, Chairman
Distribution Transformer
Subcommittee

IEEE/PES TRANSFORMERS COMMITTEE
ADMINISTRATIVE SUBCOMMITTEE REPORT
MARCH 30, 1992
UNDERGROUND TRANSFORMERS AND NETWORK PROTECTORS SUBCOMMITTEE

1.0 Membership - 23

2.0 Transformer Committee Membership

2.1 Mr. T. R. Balgie of Virginia Power was recommended for membership in the Transformers Committee.

3.0 Standards Activities

3.1 C57.12.24 - Three-Phase Underground-Type Transformers
Working ~~Group expects to complete the review of the proposed~~ revisions at the Birmingham meeting and to start the balloting process in 1992 to meet the 1993 publication requirements.

3.2 C57.12.40 - Secondary Network Liquid-Immersed Transformers
Submitted standard to IEEE Standards Board for reaffirmation approval on December 20, 1991. There were 101 affirmative votes, which included one resolved negative ballot, resulting in 100% affirmative voting for reaffirmation.

The resubmitted PAR was approved and the Working Group expects to start the balloting process in the Fall of 1992 of the revisions incorporated in the last five years.

3.3 C57.12.44 - Secondary Network Protectors
The Working Group met for a full day session on November 6, 1991 and will subsequently produce a draft of the entire 12 sections of the proposed standard. In addition to the three session meeting scheduled for Birmingham, the Group plans to meet for a full day session on March 31, 1992. The goal of the WG is to start the balloting process in 1993.

3.4 C57.12.57 - Three-Phase Dry-Type Network Transformers
Submitted standard to IEEE Standards Board for reaffirmation approval on December 17, 1991. There were 97 affirmative votes (no negative votes) resulting in 100% affirmative voting for reaffirmation.

The resubmitted PAR was approved and the Working Group expects to start the balloting process in the Fall of 1992 of the revisions incorporated in the last five years.

4.0 Nameplate Change

4.1 The Subcommittee requested the Performance Characteristics Subcommittee to review our recommendation to include the following requirement on all transformer nameplates, "Maximum PCB content of dielectric fluid at time of manufacture in parts per million."

Respectfully submitted,

Paul E. Orehek

Paul E. Orehek

Administrative Subcommittee Meeting - 3/30/92

Performance Characteristics Subcommittee Activities

Working Groups - *Failure Analysis*

Mike Altman will replace Wally Binder as Chairperson.

- *Load Tap Changer Performance Requirements*

A seminar ~~on Load Tap Changers is planned for the~~ Fall 1992 meeting in Cleveland.

Projects - *C57.110-1986 Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents*

Reaffirmation ballot has been completed with two negative ballots received. These negative ballots will hopefully be resolved at the 3/31/92 Subcommittee meeting. A one year life extension has been requested.

- *C57.18.10 Semi-Conductor Rectifier Transformers*

The approved PAR has been found.

- *C57.12.00h LTC Position Indication*

Draft 3, which is an editorial revision of Draft 2, was recirculated to the Transformers Committee and five objections were received. Resolution may require reverting to Draft 2 wording.

New Business - *C57.12.00 Table 9 - Nameplate Information*

A request has been received from the Underground Transformers and Network Protectors Subcommittee to consider revision of nameplate information to include PCB Content. Nameplate information covers rating and operating information. Should PCB Content be included?

Miscellaneous - I need additional Committee stationery.

PCS Chairman

ADSPCSA.DOC

IEEE PES TRANSFORMERS COMMITTEE
VICE CHAIRMAN'S REPORT
MARCH 30, 1992

I. Reports of PES Committees to which the Vice Chairman serves as liaison. All meetings held in conjunction with 1992 Winter Power Meeting, New York, January 27-28, 1992.

A. Publications Committee

1. Committee paper quota for 1992 SPM to be same as 1990 SPM. For Transformers Committee, this is six papers.

2. Discussion regarding reduction in allowed "free" pages (now 7) per paper to 6 or 5. If implemented, would not be effective until 1994 at the earliest.

3. Sentiment prevails that a PES overall rejection/ submittal rate of about 50% is appropriate. The consensus is that those papers passing the screening process are of high quality.

4. Effort has been initiated to modify the paper review form to provide the basis for increased acceptance of broader and more practical papers, and decreased acceptance of those with an extremely narrow view.

B. Organization and Procedures Committee

1. Continuing discussion of reviewer's comments on the Technical Council Organization and Procedures Manual. The draft manual will now be recommended for approval by the Technical Council.

   Note: A review of the Transformers Committee Operating Manual (last revised 9/1/90) for points of conflict will be required after final approval of the Technical Council document.

2. A sponsor Technical Committee has not be identified for ANSI C62.1-1982 "Insulation Coordination." There is a need to accept this as an IEEE Standard before it is withdrawn by ANSI. An ad hoc committee will temporarily serve as sponsor until a permanent home is established. A ballot of the Technical Council will be conducted to formally accept the document as an IEEE Standard.

C. Technical Sessions Improvement Committee

1. There continues to be emphasis on the need for good slides for use at the time of the presentation.

   a. A new "Blue Book" is being distributed to authors whose papers are selected for presentation. The

book describes in detail, by example, the attributes of good (and bad) slides.

b. The session chairman has the authority to reject a paper at the meeting if he judges the slides to be of poor quality. If this is to be enforced, it is the opinion that:
   - The author must be required to submit the slides for review, perhaps the day preceding the session.
   - Provision must be made by IEEE to remake the slides on-site in less than one day.

II. Technical Paper Coordination

A. 1992 Winter Power Meeting - New York - Jan. 26-30, 1992
Nine papers were presented at two sessions at the Winter Power Meeting, January 29 and 30, 1992.

B. 1992 Summer Power Meeting - Seattle - July 12-16, 1992
Thirteen papers were submitted for review by the Transformers Committee. Of these, the Transformers Committee quota of six will be scheduled for presentation at the meeting.

Respectfully submitted,

J. H. Harlow
Vice Chairman

JHH:mk

Underground Transformers and Network Protectors Subcommittee

Meeting Minutes - Birmingham, Alabama - March 31, 1992

I. Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met at 10:55 a.m. on March 31, 1992, with 16 members and one guest present. The attendance roster is attached.

II. Approval of Minutes

The ~~minutes of the November 5, 1991~~, meeting in Baltimore, Maryland were approved as submitted.

III. Chairman's Remarks

A. Administrative Subcommittee Notes

1. The February 1989 Standards Submittal Kit has been revised. The new Submittal Kit contains a 1992 Standards Manual, PAR form and a revised Submittal form for Standards. The new forms are now to be used when submitting documents for approval.

2. The NEMA TR-1 document is obsolete and is no longer valid.

3. A question was raised on ANSI/IEEE C57.100-1986 "IEEE Standard Test Procedure for Thermal Evaluation of Oil-Filled Distribution Transformers" as to whether any other document or user refers to it. It seems to stand alone and its value is uncertain.

4. The SCC Chairman will follow-up on the balloting of the Standards under the responsibility of this Subcommittee and the Distribution Subcommittee that have not yet been balloted for formal adoption into the IEEE Transformers Committee.

5. The AdCom Subcommittee agreed that the Performance Characteristics Subcommittee should determine if the request of this Subcommittee to include "PCB content at time of manufacture" on the nameplate of all transformers is proper.

6. C57.12.40 and C57.12.57 have been reaffirmed by the IEEE Standards Board on March 18, 1992.

7. Future meeting locations were discussed and it was noted that hosts for the 1995 and 1996 meetings are needed.

B. Membership

1. T. R. Balgie of Virginia Power became a new member of the IEEE Transformers Committee. Congratulations "Transformer" Tom.

2. Roger Hayes of Ferranti-Packard replaced Frank Perri and M. Valbuena of Florida Power and Light replaced J. Valdes on the Subcommittee. Membership remains at 23.

IV. Working Group Reports

A. Three-Phase Underground-Type Transformers (C57.12.24) J. W. Howard - Chairman

1. The Working Group met on Monday, March 30, 1992, at 1:20 p.m. with 12 members and three guests present.

2. The minutes of the November 4, 1991, Baltimore, Maryland meeting were approved as written.

3. H. Lewis of Kuhlman resigned from the Working Group and Roger Hayes of Ferranti-Packard replaced Frank Perri.

4. Percent impedance values were included in the Standard and are the same as those in the three-phase padmounted transformer standard C57.12.26.

5. Low-voltage bushing designations in Figure 4 and the contents of this Figure were revised to be the same as that of the three-phase transformer standard C57.12.26.

6. Table 4 for Electrical Characteristics for Transformer Connectors was revised to include a 21.1-kV Voltage Rating for the 125-kV BIL Winding Insulation Levels.

7. All revisions will be incorporated into a new Draft #5. This Draft will be used to start the balloting process for final approval and publication in 1993.

8. The Working Group meeting adjourned at 2:24 p.m.

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

1. The Working Group met on Monday, March 30, 1992, at 2:45 p.m. with 15 members and four guests present.

2. The minutes of the November 5, 1991, Baltimore, Maryland meeting were approved as written.

3. Roger Hayes of Ferranti-Packard replaced Frank Perri and M. Valbuena replaced J. Valdes on the Working Group.

4. The Standard was reaffirmed by the IEEE Standards Board on March 18, 1992.

5. The figure for the high voltage terminal chamber was revised so that the cable entrance lines up with the bushing centers when wiping sleeves are provided.

6. The overall height of the transformers to the cover dimensions will be added to Tables 3 and 6 for tank dimensions for oil-filled units.

7. New tank dimension tables for silicon fluid filled units will be added. The maximum throat height dimension specified for oil-filled units will be used.

8. A note will be added to the figures for the secondary flex connectors stating that "a mimimum of 1 1/2 inch clearance shall be maintained between the flex connector and any ground plane."

9. All revisions will be incorporated into a new Draft #3 and will be used in the balloting process to revise the Standard. Although the Standard was just reaffirmed, no revisions since 1987 have been incorporated. Therefore, the balloting process will start with publication hopefully in 1993.

10. The meeting adjourned at 5:00 p.m.

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

1. The Working Group met on Monday, March 30, 1992, at 8:00 a.m. for three sessions with 15 members and one guest present.

2. The minutes of the November 4 and 6, 1991, Baltimore, Maryland meetings were approved as submitted.

3. The Working Group has developed 12 Sections for this proposed Standard and plans to complete review of all Sections at this meeting and than incorporate these sections into a Draft #1 document.

4. The Working Group also met for a full day session on Wednesday and expects to complete the review of the Standard and start the ballotting process in 1993.

5. The March 30, 1992, meeting adjourned at 12:00 noon.

D. **Dry-type Network Transformers (C57.12.57)**
B. Nutt - Chairman

1. The Working Group met on Tuesday, March 31, 1992, at 8:00 a.m. with 14 members and 18 guests present.

2. The minutes of the November 4, 1992, Baltimore, Maryland meeting were approved as submitted.

3. The Standard was reaffirmed by the IEEE Standards Board on March 18, 1992.

4. Draft #5 was revised to include language similar to that in the liquid-filled standard for the high-voltage line terminations, the interrupting rating and lifting provisions.

5. The requirement for a positive electrical bond between metallic panels was included in the enclosure paragraph.

6. Changes will be incorporated into Draft #6 and the balloting process will begin with publication expected in 1993.

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

V. Future Meetings

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

Oct 19-21, 1992	Cleveland (Sheraton City Center), Ohio
March 28-31, 1993	Portland (Red Lion Lloyd Center), Oregon
Fall, 1993	St. Petersburg, Florida
Spring, 1994	Dallas, Texas
Fall, 1994	Milwaukee, Wisconsin
Spring, 1995	Kansas City, Missouri

The meeting adjourned at 11:55 a.m.

Respectfully submitted,

Paul E. Orehek

Paul E. Orehek
Chairman

Attachments

Underground Transformers and Network Protectors Subcommittee Meeting
Attendance Roster - Birmingham, Alabama - March 31, 1992

Members Present

T. R. Balgie	Virginia Power
E. A. Bertolini	Consolidated Edison of New York
R. W. Fisher	Potomac Electric Power
R. D. Graham	General Electric
R. Hayes	Ferranti-Packard
J. W. Howard	Pennsylvania Power and Light
M. C. Mingoia	Edison Electric Institute
J. R. Moffat	Westinghouse Electric
~~D. H. Mulkey~~	~~Pacific Gas and Electric~~
C. G. Niemann	Commonwealth Edison
B. Nutt	Texas Utilities
P. E. Orehek	Public Service Electric and Gas
R. L. Plaster	ABB Power T&D
P. Risse	Georgia Power
R. B. Robertson	Tampa Electric
A. L. Robinson	Central Power and Light

Members Absent

W. Caldwell	ABB Power T&D
K. Ginthwain	General Electric
C. E. Griffith	Potomac Electric Power
J. L. Harper	Arizona Public Service
J. Nay	Consultant
H. J. Sim	Square D
M. Valbuena	Florida Power and Light

Guests

R. Steward	Florida Power and Light

Attendance Summary

	Present	Absent
Members	16	7
Guests	1	

MEMBERSHIP ROSTER
(As of 4/15/92)
UNDERGROUND TRANSFORMERS AND NETWORK PROTECTORS SUBCOMMITTEE

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PEO
MEMSUBCO9
4/15/92

April 28, 1992

Performance Characteristics Subcommittee

Meeting Minutes - Birmingham, Alabama - March 31, 1992

I. Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 9:30 a.m. on Tuesday, March 31, 1992, with 47 members and 73 guests in attendance.

II. Approval of Minutes

The minutes of the November 5, 1991, PCS Meeting were approved as written.

III. Chairman's Remarks

A. Administrative Subcommittee Notes

The following information, obtained at the March 30, 1992, meeting of the Administrative Subcommittee was presented:

1. Future Committee meetings are scheduled as follows:

Fall 1992	-	Cleveland, OH - Oct. 18-21
Spring 1993	-	Portland, OR - Mar. 28-31
Fall 1993	-	St. Petersburg, FL
Spring 1994	-	Dallas, TX
Fall 1994	-	Milwaukee, WI
Spring 1995	-	Kansas City, MO
Fall 1995	-	(East)
Spring 1996	-	(West)

2. The C57-1992 Standards Collection has been published.

3. The standards development kits have been updated. Any project chairman who has not received the updates should contact George Vaillancourt. New forms for PAR and Standards Board Submittals are included.

4. All new PARS have a four year life from the date they are approved. Additionally, all existing PARS will have a four year life starting May 8, 1992, and therefore will expire on May 8, 1996.

5. The 1992 Standards Board meeting schedule is as follows:

Meeting Date	Submittal Deadline
June 19	May 8
September 19	August 7
December 3	October 23

6. Sue Vogel has been promoted to a different job. She will continue as our Coordinator with the Standards Board until a replacement is named.

7. Some problems have been noted with the editing service received from the Standards Office. Notify me if you incur any problems in this area.

8. The status report on PCS Projects is attached. (Attachment PCS-A)

9. A final, but sad, note is that Hal Margolis, a life member, has passed away.

B. Membership

Dave Barnard (Acme), Donald Chu (Con Ed), Fred Elliott (BPA), Dave Goodwin (PE), Barin Kumar (SMUD), Ed Norton (Consultant), Dennis Orten (NAT), Dinesh Patel (Southern Company Services), Mark Perkins (ABB), Jeewan Puri (Square D), Mahesh Sampat (GE), Ken Skinger (Stone and Webster), Gary Sparagowski (Detroit Edison), Werner Stein (Siemens) and Joe Watson (LA Dept. of Water & Power) were added to the roster. Bob Lee, Tito Massouda, Frank McCann, Dan Perco and Leo Savio were removed from the roster. Membership now stands at 78.

IV. **Agenda Changes** - None

V. **Working Group Reports**

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

Prior to presentation of the following report by the new WG Chairperson, Mike Altman; I thanked the outgoing Chairperson, Wally Binder, and the Subcommittee applauded Wally's excellent work leading this group.

Mike presented the following WG report:

Meeting called to order at 1:20 p.m. with 14 members and 27 guests.

W. B. Binder announced he would be stepping down as Chairman of the Working Group. M. S. Altman would be taking on the duties of Chairman.

W. B. Binder reported the galley proof of C57.125 was back from the Editor. Those present were allowed 20 minutes to review the standard. Mr. Binder asked that any comments be sent or faxed to him by Monday. He must let the Editor know by April 7.

W. B. Binder discussed ballot to reaffirm C57.117 Guide for Reporting Failure Data. The ballot was good - 99% affirmative. One (1) negative ballot called for eliminating terms like Megger or Doble from standard. The submitter of this ballot agreed to withdraw his vote if terms are removed during reaffirmation. This slight change was thought to be within the scope of a reaffirmation and will be done.

Harold Light proposed a survey of GSU failure. Harold reviewed his experience with GSU failure at a nuclear plant. He had no data to give to NRC. Various comments were made about difficulties in getting a response from anyone on this type of survey. Harold proposed a motion and it was seconded and voted on. Vote was 8 to 2 in favor.

Harold Light agreed to chair this TF and Ed Norton. Lou Tauber and W. B. Binder agreed to be members.

There being no further business, the meeting was adjourned.

Following the WG report, Harold Light led a discussion in the PCS on the proposed industry survey on GSU transformer failures. The discussion covered problems encountered in obtaining historical failure data when investigating a GSU transformer failure. It was pointed out that data is available on nuclear plant GSU transformer failures. Data is also available to EEI user members on failures of GSU transformers owned by EEI members. The problem is that limited data is available to a limited number of people. It has been determined that a survey of this nature is within the scope of our Committee. The majority of attendees at the PCS meeting were in favor of conducting an industry survey to obtain a history of GSU transformer failures.

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

The WG on Loss Tolerances and Measurement met on Monday, March 30, 1992, at 2:50 p.m. with 10 members and 12 guests present. The minutes of the previous meeting were reviewed and accepted without change. First was a report on the joint meeting with a Power System Instrumentation and Measurement Task Force on low power factor power measurement. The task force is writing a guide that covers instrumentation used to measure power at low power factor. An outline for the entire guide was presented and modified at the meeting. The scope and introduction sections have been written.

The next item on the agenda was a task force report by Ramsis Girgis on Guide for Transformer Loss Measurement. The section of the guide on no-load losses has been completed. Jeewan Puri, Bill Henning, Eddy So and Jin Sim accepted assignments to write specific sections of the rest of the guide. A special meeting of the task force will be held in May in St. Louis to consolidate these sections to complete the guide. The idea of a working group paper on this subject will be developed.

The last subject discussed was the main committee ballot on a reference temperature for no-load losses and accuracy requirements for transformer loss measurement.

Two negative votes on this proposal were concerned with correcting for the power loss in the shorting connection of low voltage, high current windings. These two negative votes were resolved by action in the Working Group. The WG will study and develop a method for making this correction for transformers with ratings where this effect is significant.

The other two negative votes objected to the 20°C reference temperature for no-load loss and to the fact that the no-load losses and the load losses have different reference temperatures. Both negative voters agreed to change their votes to affirmative in defense of the opinion of the majority of the Transformers Committee members.

Other comments regarding editorial changes were discussed. At this point, the time was 4:15 p.m. and the meeting had to be adjourned so that members and guests could attend other meetings. After the meeting, two objections were raised regarding the ±3% accuracy requirement for the measurement of power. By this time most

working group members had left the meeting, and effective discussion of this subject was not possible at this WG meeting.

Following this report, the last item mentioned in the report was discussed. It was clarified that the project has been successfully balloted in the Working Group, Subcommittee and Committee with no objection to this tolerance, and therefore, will be submitted to the Standards Board. The objections now being raised will be addressed in New Business at the next Working Group meeting.

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

The Working Group met on Monday, March 30, 1992, at 8:00 a.m. and 9:30 a.m. There were 21 members and 11 guests present.

Minutes of the November 4, 1991, meeting were approved.

Draft 7 was distributed to those present. Draft 7 will be mailed to the Working Group members who were not present. This ballot is due July 31, 1992.

Don Kline asked for time to discuss his recent studies on testing and harmonics. Don demonstrated that when a rectifier is connected directly to a transformer for a combinational test, with a short circuit on the rectifier outputs, the harmonics are essentially eliminated. With this conditional, the square wave resolves into a sinusoidal waveform. If a heat run is conducted in this fashion, the resulting transformer temperature rise will be less than what will be experienced in actual service due to the elimination of the square wave and its resulting harmonics. In order to supply a load current on the transformer equivalent to a square wave of the rated rms current, 110% current will be required in the transformer due to the sinusoidal waveshape.

The difference between K-factors based on fundamental current and rms current was discussed. The fundamental K-factor has a fundamental current of 1.0 per unit. The rms K-factor has an rms current of 1.0 per unit. The rms K-factor should be used and it will give a K-factor value slightly less than the fundamental K-factor.

Don Kline has also performed a Fourier Analysis of voltage harmonics. It is well know that we have odd harmonics associated with load currents. Don showed that there are even voltage harmonics on the secondary bus due to rectifier operation. However, these do not appear on the primary side of the transformer.

Don also demonstrated that additional harmonics were possible with back-to-back thyristors. While we may have a K-factor of 9 with a standard 6 pulse circuit, this may increase to a K-factor of 18 if back-to-back thyristors were employed and a 90° phase angle was required for the load. The thyristor load should be operated as close to full voltage as possible to reduce the phase angle and its associated harmonics. A tapped transformer should be used to achieve this.

Don's work showed that with a 6 pulse rectifier, we might find an rms K-factor at no load of 8.58. However, the rms K-factor would decrease to a value of 3 under full load conditions. This is only true for resistive loads. Other loads may produce other values of rms K-factor. This only applies to diodes, however. A phase controlled thyristor may start with an rms K-factor of 9 at no load, but it will decrease to about 6 at full load as opposed to a value of 3 with a diode.

Based on these findings, Table 11 will be revised to state that it is for no-load conditions. Wording should be added that IEEE 519 should be used along with the load characteristics to calculate the possible harmonic current magnitudes and resulting K-factor.

It was proposed that the scope should be revised, if possible. The wording should state that:

"This standard includes semiconductor power rectifier transformers for dedicated loads rated:

a. Single Phase 300 kW and above
b. Three Phase 500 kW and above

Other non-linear loads should be excluded".

The balance of the wording would remain as is. If this can't be changed in the scope, the wording should be added in the forward. The purpose of this is to emphasize that this standard is for transformers applied to single, dedicated rectifier loads. Other transformers and loads should refer to C57.110.

It was pointed out that the latest drafts have left out previous wording which referred to special conditions which apply to circuit 31 transformers with paralleled primary windings. This will be re-instated.

Section 8.10 has an error regarding temperature tests. The wording in the first paragraph assumes that we are discussing a liquid filled transformer. It should be revised to include dry type transformers as well.

The members were encouraged to submit further comments and discussion. Special consideration was requested regarding the handling of the harmonic losses. Ballots for Draft 7 are due back by July 31, 1992.

Lawrence Kirchner, Timothy Holdway and Michael Mitelman requested membership on the Working Group.

The Working Group adjourned at 10:45 a.m.

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

In addition to the attached report (Attachment PCS-B), Bipin noted that Draft #3 of this project will be balloted in PCS first, then in the Committee.

E. Qualification of Transformers for Class IE Application in Nuclear Power Stations - L. W. (Lin) Pierce

The Working Group did not meet during this session. Lin Pierce submitted the attached status report (Attachment PCS-C) on IEEE 638.

Subsequent to this meeting, we learned that the Standards Board approved this document at it's March 1992 meeting.

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

The LTC Performance Requirements Working Group met at 2:50 p.m. on Monday, March 30, 1992, with 16 members and 26 guests in attendance. Introductions were made and the minutes of the previous meeting in Baltimore, Maryland were approved.

The WG is planning to present a symposium on the subject of load tap changers at the next meeting in Cleveland. Ron Stoner is coordinating the program. Presently it is anticipated that the program will consist of four parts: (1) Present standards and the need for additional standardization, (2) Resistance type LTCs and the design and application considerations that are unique to them, (3) Same as (2) except for reactance type LTCs and (4) Requirements and test procedures to be included in the new IEEE standard which is under development.

The Chairman presented a summary of the recent ballot by the Performance Characteristics Subcommittee on the proposed new LTC standard C57.131, titled "Standard Requirements for Load Tap Changers". There were 59 ballots sent out and 46 (77%) were returned. Of the 46 returned ballots, 40 were affirmative, one was negative and there were five abstentions. The remainder of the meeting consisted of a discussion of the many comments that were received as a result of the balloting on the latest draft which is Draft 6.

Ten different comments were discussed; however, two of the major comments are as follows:

- The present draft states that "Unless specified otherwise, LTCs shall be suitable for operation when immersed in insulating fluid over a range of temperatures from -25C to 100C. The lower limit of -25C is different than the transformer standard requirement of -20C, but is the same as required by IEC. It was decided to leave the lower temperature limit at -25C. The upper limit of 100C is also the same as IEC, but it was pointed out that this value is too high if the LTC is located in a separate compartment and possibly too low if it is located in the main tank. The next draft will show two upper limits, depending on the location of the LTC; however, agreement could not be reached on what values should be used for the upper limits. Further discussion on this subject was tabled until the next meeting. Several WG members volunteered to bring to the next meeting the results of tests that measured transformer top oil temperature and the corresponding oil temperature in a separate LTC compartment.

- The second major comment concerned the amount of circulating current that should be used for temperature rise tests on reactance type LTCs. Draft 6 of the proposed standard states that the temperature rise of contacts shall not exceed 20C when: (1) The through-current is equal to 1.2 times the maximum rated through current, (2) Circulating current is equal to 35% of the maximum rated through current, and (3) The power factor is 80%. Circulating current must be considered for reactance type LTCs since the highest temperature rises will occur when the LTC is in the bridging position. After considerable discussion, the concensus was that 35% circulating current was too low and that it should be changed to 50%.

The Working Group meeting adjourned at 4:10 p.m.

VI. Project Reports

A. PC57.12.00k - Revision of C57.12.00, Table 16 - C. J. (Chuck) McMillen

Chuck reported that documentation of this project for submission to the Standards Board is complete except for coordination with NEMA. This will be completed shortly and the project will be ready for submittal with the combined C57.12.00 projects.

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

Bob reported that Draft 3, which was editorially revised to resolve two negative ballots received on Draft 2, was recirculated to the Transformers Committee. Five negative ballots were then received on Draft 3. Four of these negatives resulted from editorial revisions made to resolve one negative received on the previous ballot. These four negatives have been resolved in Draft 4 by reverting to only slightly revised wording of Draft 2 (see Attachment PCS-D).

The one remaining negative ballot may not be resolvable because the ballot suggests technically different wordage which would require complete reballoting.

This project will be prepared for submittal with the combined C57.12.00 projects.

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

Resolution was obtained on two negative ballots of Draft 3 in the Transformers Committee. Liaison coordination has been completed and this project is ready for submittal to the Standards Board with the combined C57.12.00 projects.

VII. Old Business

A. Altitude Correction Formula - P. E. Krause

Peter Krause had prepared an editorial correction to Equation 24 in Section 11.6 of C57.12.90-1987 to balance the units of measurement. This correction was included in the minutes of the last PCS meeting with a request to notify Peter if there were any objections. No comments were received, so this correction will be submitted with the combined C57.12.90 revisions.

B. Reaffirmation of C57.105-1987 - G. J. Reitter

George reported that this ballot was completed with 84% of the ballots returned and 100% approved. This document, which is the guide for Application of Transformer Connections in Three Phase Systems, will be submitted for reaffirmation.

C. Reaffirmation of C57.110-1986 - M. A. Cambre

This document, the Recommended Practice for Establishing Transformer Capability When Supplying Non-Sinusoidal Load Currents, had been balloted for reaffirmation in the Transformers Committee. A task force, headed by Max Cambre, had been formed to review the proposals which accompanied the two negative ballots received in this ballot.

Max reported on the recommendations of the Task Force (see Attachment PCS-E). The Task Force determined that the proposals raised sufficient questions regarding application of the Guide to design requirements of new transformers to warrant further discussion in the PCS. They recommended requesting life extension to address these concerns.

Life extension was requested, and approved, through March 23, 1993.

Discussion in PCS led to the conclusions:

1. Some revisions, probably including the scope, are required, and

2. The present document is valuable to the industry, and therefore reaffirmation should be persued because revision will probably take longer than the present life extension.

A working group was formed, with approval by John Borst - Committee Chairperson, to address this project. Max Cambre volunteered to chair the working group, and Roy Bancroft, Dave Barnard and Mike Mitelman have volunteered as members.

VIII. New Business

The following three New Business items could not be addressed due to lack of time. Details on these items will be sent to PCS members for discussion at the next meeting:

A. Request for addition of PCB Content to Nameplate Information in C57.12.00.

B. Revision of Cooling Class Designations in C57.12.00.

C. Request for addition of data required on Manufacturer's Test Reports in C57.12.90.

IX. Next Meeting

The next meeting will be held on Tuesday, October 20, 1992, in Cleveland, Ohio.

The meeting was adjourned at 10:50 a.m.

Respectfully submitted,

John W Matthews

John W. Matthews
PCS Chairman

PCSMIN.DOC

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE
ATTACHMENT 1

*STANDARD / PROJECT	*TITLE	PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.119	*GUIDE FOR PERFORMING OVERLOAD HEAT RUNS FOR OIL IMMERSED POWER TRANSFORMERS				*SWGR,SUBS,SCC4,PSRC,IAS,EI			BALLOTING MAIN COMMITTE
P838		/ /	THERMAL TESTS	R. L. GRUBB		09/18/80	02/22/92	
**SUBCOMMITTEE: NONE ASSIGNED / CHAIRPERSON: NONE ASSIGNED / PHONE:								
*C57.12.70	*TERMINAL MARKINGS AND CONNECTIONS FOR DISTRIBUTION & POWER TRANSFORMERS				*,,,,,			BALLOTTING TRANSFER TO
NONE		12/17/86				/ /	/ /	BALLOTTING REAFFIRMATIC
*C57.12.80	*TERMINOLOGY FOR POWER & DIST TRANSFORMERS				*,,,,,			SUBMIT TO SB 03/18/92
NONE		12/17/86				/ /	/ /	REAFFIRMED 100%, 88% RE
*C57.15	*REQ, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE AND INDUCTION VOLTAGE REGULATORS				*,,,,,			SUBMIT REAF TO REVCON C
NONE		03/18/8		J. H. HARLOW		06/19/86	/ /	REAFFIRMED 100%, 88% RESPONSE
**SUBCOMMITTEE: PERFORMANCE CHARACTERISTICS / CHAIRPERSON: J. W. MATTHEWS / PHONE: ~~(301)384-8775~~								
*C57.125	*GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION AND ANALYSIS FOR POWER TRANSFORMERS AND SHUNT REACTORS				*T&D,ED&PG,PSE,SWGR,,			APPROVED BY STD BOARD 6/26/91
PC57.125		/ /	FAILURE ANALYSIS	W. B .BINDER, JR.		06/28/87	10/16/90	ANSI APPROVED 11/20/91
*C57.123	*GUIDE FOR TRANSFORMER LOSS MEASUREMENT				*,,,,,			TF WORKING
P1098		/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING	RAMSIS GIRGIS	06/13/85	/ /	
*C57.12.00	*REV. OF SECTION 5.9 REFERENCE TEMP FOR NO-LOAD LOSS				*,,,,,			BALLOTTING MAIN COMMITTEE
PC57.12.00c1		/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	09/04/91	INCLUDE IN 1992 REVISION
*C57.12.00	*ADD TO SEC 9.3.1 ACCURACY REQUIREMENT FOR MEASURED LOSSES				*,,,,,			BALLOTTING MAIN COMMITTEE
PC57.12.00c2		/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	09/04/91	INCLUDE IN 1992 REVISION?
*C57.12.00	*TRANSFORMER LOSS MEASUREMENT AND TOLERANCES				*,,,,,			MERGED INTO P462 (now 12.00c)
P787		/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING		06/28/79	/ /	

ATTACHMENT PCS-A

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE
ATTACHMENT 1

*STANDARD / PROJECT	*TITLE	PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.12.90 PC57.12.90e	*REVISION TO SEC 9 IMPEDANCE AND LOAD LOSSES	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING	*,,,,,	06/28/79	09/05/91	BALLOTTING MAIN COMMITTEE INCLUDE IN 1992 REVISION
*C57.12.90 PC57.12.90e3	*REVISION TO SEC 8 NO-LOAD LOSSES & EXCITATION CURRENT	/ /	LOSS TOLERANCE AND MEASUREMENT	W. R. HENNING	*,,,,,	06/28/79	09/04/91	BALLOTTING MAIN COMMITTEE INCLUDE IN 1992 REVISION
*C57.131 PC57.131	*REQUIREMENTS FOR LOAD TAP CHANGERS	/ /	LTC PERFORMANCE REQUIREMENTS	T. P. TRAUB	*EM,T&D,,,,	08/17/89	12/01/91	BALLOTTING S.C.
*C57.105 PC57.105	*GUIDE FOR APPLICATION OF TRANSFORMER CONNECTIONS IN THREE-PHASE DISTRIBUTION SYSTEMS	06/11/78	PROJECT	GEORGE REITTER	*,,,,,	/ /	/ /	BALLOTTING REAFFIRMATION REAFFIRM 1992 ANSI WDN
*C57.110 PC57.110	*RECOMMENDED PRACTICE FOR ESTABLISHING TRANSFORMER CAPABILITY WHEN SUPPLYING NONSINUSOIDAL LOAD CURRENTS	08/21/87	PROJECT	MAX CAMBRE	*,,,,,	/ /	/ /	BALLOTTING REAFFIRMATION REAFFIRMED 97%, 88% RESPONSE
*C57.12.00 PC57.12.00h	*LTC TAP POSITION INDICATION	/ /	PROJECT	R. H. FRAZER	*NONE,,,,,	09/28/86	12/17/91	CIRCULATION OF CHANGES INCLUDE IN 1992 REVISION
*C57.12.00 PC57.12.00i	*NAMEPLATE INFORMATION CHANGE DIRECTED vs. NON-DIRECTED FLOW	/ /	PROJECT	J. W. MATTHEWS	*TBA,,,,,	12/28/86	/ /	CHECKING COORDINATION INCLUDE IN 1992 REVISION
*C57.12.00 PC57.12.00k	*TABLE 16-C ROUTINE DIST TR RESISTANCE TEST	/ /	PROJECT	C. J. McMILLEN	*,,,,,	03/28/87	/ /	DOCUMENTATING COORDINATION INCLUDE IN 1992 REVISION
*C57.12.90 NONE	*SECTION 7.3 FIGURES 9 & 10 REVERSED	/ /	PROJECT		*,,,,,	/ /	/ /	READY INCLUDE IN 1992 REVISION
*IEEE 638 P638	*QUALIFICATION OF CLASS 1E TR FOR NUCLEAR POWER GENERATING STATIONS	/ /	QUALIFICATION OF TR FOR 1E APP	L. W. PIERCE	*NPE,SUB,SC2,SCC10,,	10/29/90	04/27/90	SUBMITTED TO BOARD 11/01/91 NEW PAR APPROVED 12/04/90
*C57.18.10 PC57.18.10	*REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS	/ /	SEMI-CONDUCTOR RECT TR	SHELDON KENNEDY	*NONE,,,,,	12/28/81	/ /	BALLOTTING WORKING GROUP

STATUS REPORT ON STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE
ATTACHMENT 1

*STANDARD / PROJECT	*TITLE / PUB DATE	WORKING GROUP	WG CHAIRPERSON	*COMMITTEES REQUESTING COORDINATION / TF CHAIRPERSON	PAR DATE	DRAFT DATE	STATUS AND COMMENTS
*C57.109	*GUIDE FOR THROUGH-FAULT CURRENT DURATION			*PSR,,,,,			BALLOTTING D02 @ WORKING GROUP
PC57.109	08/19/85	SHORT-CIRCUIT DURATION	B. K. PATEL		06/27/91	12/01/91	LIFE EXTENDED TO 12/92 100%
*C57.21	*REQUIREMENTS,TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500kVA			*EM,T&D,PSR,,,			COMPLETE
PC57.21	04/02/91	TEST CODE FOR SHUNT REACTORS	J. W. McGILL		06/09/88	03/20/90	ANSI APPROVED 08/09/91
*C57.116	*GUIDE FOR TRANSFORMERS DIRECTLTY CONNECTED TO GENERATORS			*,,,,,			APPROVED BY SB 01/03/89
NONE	01/03/89	TR DIRECTLY CONNECTED TO GEN	B. K. PATEL		/ /	/ /	NOTHING OUTSTANDING
*C57.117	*GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS			*,,,,,			UNDER REVIEW BY FAILURE W.G.
P786	08/21/87	TRANSFORMER RELIABILITY	W. BINDER		/ /	/ /	LIFE EXT SUB.TO SB 03/18/92
**SUBCOMMITTEE: PSRC RELAY INPUT SOURCES / CHAIRPERSON: / PHONE:							
*C57.13.1	*GUIDE FOR FIELD TESTING OF RELAYING CURRENT TRANSFORMERS			*,,,,,			TRANSFER FROM PSR
NONE	08/25/87				/ /	/ /	SUBMIT REAF.TO REVCOM 03/18/92
**SUBCOMMITTEE: PSRC RELAY PRACTICES / CHAIRPERSON: / PHONE:							
*C57.13.3	*GUIDE FOR THE GROUNDING OF INSTRUMENT TR SECONDARY CICUITS AND CASES			*,,,,,			
NONE	01/23/87				/ /	/ /	
**SUBCOMMITTEE: UG TR & NETWORK PROTECTORS / CHAIRPERSON: P. E. OREHEK / PHONE: (201)430-7743							
*C57.12.24	*UNDERGROUND-TYPE 3-PHASE DIST- RIBUTION TRANSFORMERS,2500kVA AND SMALLER: HV,34500GrdY..& BELOW,LV,480 V AND BELOW			*T&D,IC,IAS/REP,IAC/PSE,,			PAR APPROVED BY STD. BOARD
PC57.12.24	05/10/88	3-PHASE UG-TYPE TRANSFORMERS	J. W. HOWARD		06/27/91	11/04/91	BALLOT TRANSFER TO TR COMM
*C57.12.57	*REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500kVA AND BELOW, W/HV 34500V AND BELOW,LV 216Y..AND 480Y..			*T&D,EE1/T&D,SCC14,,,			BALLOTTING TRANSFER TO TR COMM
PC57.12.57	08/15/86	DRY-TYPE NETWORK TRANSFORMERS	B. NUTT		12/05/91	/ /	SUBMIT TO SB 03/18/92

WG - Revision of Transformer Through-Fault-Current
Duration Guide - C57.109
Birmingham Meeting - 1992

Minutes of the Meeting

The WG met at 4:15 p.m. on March 30, 1992 with twelve members and thirteen guests present which included D. W. Platts of Pennsylvania Power & Light who requested membership.

The minutes of the Baltimore meeting were approved as written.

Draft #2, a marked-up copy of the C57.109-1985 guide was balloted last December in the WG. The results of the balloting were discussed as follows:

Total ballots sent out:			20
Ballots returned:		15	
Approved	9		
Approved with comments	6		
Disapproved	0		
Ballots not returned:		5	
	--	--	--
Total	15	20	20

The balloting was successful with 75% of the ballots returned.

Next, the balloted Draft #2 revised with additional markings reflecting the comments of the balloting were discussed. All comments were editorial. The tables adopted from ANSI C57.12.00 will be sequentially numbered with proper referencing and the figures with two curves will be slightly separated for clarity. The conclusion was to prepare Draft #3 for further balloting. The chairman advised that the PAR for the WG would expire by the end of this year. In order to complete the revision of the guide, Draft #3 has to be balloted in the Performance Subcommittee and Main Committee prior to the October meeting in Cleveland, Ohio. He will investigate the possibility of balloting in both committees simultaneously. He further added that two ballots required in the next six months is a very ambitions task but with the cooperation from the members it can be done.

Draft #3 will be balloted soon.

There was no old or new business brought up for discussion. After usual introduction, the meeting adjourned at 5:10 p.m.

Bipin K. Patel
April 16, 1992

BKP/mja
DEC#2273

GE Power Delivery

[illegible]

March 27, 1992

John Mathews, Chairman
Performance ~~Characteristics Subcommittee~~
IEEE Transformers Committee

Status Report: P638, Working Group on Qualification of Class 1E Transformers.

The final draft of "Standard Qualification of Class 1E Transformers for Nuclear Power Generating Stations" was scheduled for consideration by the IEEE Standards Board at the March 1992 meeting. As of March 27, 1992 I have received no word of Standards Board action.

[signature]

Linden W. Pierce, Chairman
Working Group on Class 1 E Transformers

- ATTACHMENT PCS-D -

Present Wording of C57.12.00 Table 9, note 4 "Nameplate Information"

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

(PC57.12.00h/D4)

PROPOSED WORDING OF C57.12.00 TABLE 9, NOTE 4 "NAMEPLATE INFORMATION" AFTER RESOLUTION OF ALL NEGATIVE BALLOTS

The NEUTRAL position (THAT POSITION IN WHICH THE LTC CIRCUIT HAS NO EFFECT ON THE OUTPUT VOLTAGE) shall be designated by the letter N for load-tap-changers. The raise range positions shall be designated by numerals in ascending order, corresponding to increasing OUTPUT voltage, followed by the suffix R, such as 1R, 2R, etc. The lower range positions shall be designated by numerals in ascending order, corresponding to decreasing OUTPUT voltage, followed by the suffix L, such as 1L, 2L, etc. (this applies to the relationship between two windings of a transformer only, such as the H and X windings). IN THE EVENT OF SYSTEM REQUIREMENTS SUCH AS REVERSAL OF LOAD FLOW, REGULATION OF INPUT VOLTAGE (LTC IN THE PRIMARY WINDING), OR ANY UNUSUAL CONDITIONS, NAMEPLATES SHALL HAVE RAISE-LOWER DESIGNATIONS AS SPECIFIED BY THE USER.

ROBERT H. FRAZER 3/30/92

- ATTACHMENT PCS-E

PROJECT REPORT

RESOLVING NEGATIVE BALLOTS ON REAFFIRMATION OF C57.110

Introduction:

The Transformer Committee was polled as to the reaffirmation of C57.110, "Reccommended practice ~~of~~ for establishing Transformer Capability when Supplying Nonsinusoidal Load Currents." Two negative ballots were returned, with a third one coming in after the expiration of the voting period. To deal with these negative ballots, a task force was formed with Max Cambre as chairman, and consisting of Dave Barnard, Jerome Frank, Sheldon Kennedy, Michael Mitleman and Henry Windich.

The resolving procedure consisted of the Chairman sending copies of the negative ballots to each of the task force members with two objectives, 1) to determine if the reasons for the negative ballots were valid and 2) that there would be enough support of the negative ballots to to request an extension of the present guide.

Of the six members of the task force, two thought the guide should be reaffirmed and four voted for some changes. The same four reccomended that the present guide be extended. Based on the four reccomendations, the chairman informed John Matthews that the task force reccomended that C57.110 be extended until further discussion would result on some positive action.

Following is an attempt to pool some of significant comments supporting the negative votes.

1. While the scope of the guide includes specification of new transformers for supplying nonsinusoidal loade, there are some deficiencies in applying the guide to new transformers. For instance nothing is said of a heat run procedure,rather the derating equation in 5.4 is repeated. Other standards agencies have been going forward in this area of testing.

REPORT - PAGE 2

2. The choice of 5.3 or 5.4 is based simply upon the availability of basic data on eddy losses versus having only The Certified Test report. The guide should suggest the method also based on units already in the field versus new units being built.
3. The guide does not cover overheating of neutrals due to triplens. The zero sequence nature of the triplens can cause neutral currents to be much higher than the line currents.

Max A. Cambre
3-26-92

ROSTER

PERFORMANCE CHARACTERISTICS SUBCOMMITTEE

OF THE

IEEE TRANSFORMERS COMMITTEE

APRIL 16, 1992

Membership: 78

CHAIRMAN: John W. Matthews
Baltimore Gas and Electric
ETF-RBC
Baltimore, MD 21203-1475
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Barker, R. L.	Virginia Power (804) 257-4671 FAX 257-4750	P. O. Box 26666 Richmond, VA 23261
Barnard, D. A.	Acme Transformer (919) 738-4251 FAX 739-0024	4815 West Fifth St. Lumberton, NC 28358
Bartek, A.	Cooper Power Systems (412) 873-2582 FAX	P.O. Box 440 Canonsburg, PA 15317
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MEETING MINUTES
INSULATION LIFE SUBCOMMITTEE
OF THE
IEEE TRANSFORMER COMMITTEE
AT THE
WYNFREY HOTEL
BIRMINGHAM, ALABAMA

The Insulation Life Subcommittee met on Tuesday, March 31, 1992, at 2:00 P.M. There was a total attendance of 71, consisting of 26 subcommittee members and 45 guests.

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

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

Mike Lau	- BC Hydro
VSN Sankar	- Ontario Hydro

After review of Administrative Subcommittee items, the first working group report was given by Dave Takach, Chairman of the Working Group on Guides for Loading. Dave reported that his Working Group met for a double session at 8:00 A.M. on Monday, March 30, with 34 members and 40 guests present - a record attendance.

Dave Douglas, Chairman of the Task Force on Insulation Loss of Life, indicated that the fourth meeting of his group was held on Sunday, March 29, with 8 Task Force members and 17 guests present.

He reported that a Task Force ballot was sent out in February containing a revised Section 4.2, "Transformer Insulation Life", a revised appendix I-1, "Historical Procedures", and a revised appendix I-2, "Thermal Aging Principles". These revisions incorporate a definition of transformer insulation "End of Life" in Section 4.2, and provide additional tutorial information in the two appendices.

The majority of the Task Force meeting time was spent addressing two negative ballots. Resolution of the negative ballots required several changes in Appendix I-2. Table II will be corrected and a sample calculation containing a 180^{o}C hottest spot temperature will be included. Resulting life calculations will be uprated using three significant digits, as opposed to the five or six decimal points of precision now being used.

A new draft of the insulation life material will be formulated, and a second ballot of the Task Force will be made. Unless there are serious negative ballots, which are not anticipated, this material will be submitted to the Working Group for incorporation into the new guide.

Olin Compton reiterated his concern that Table 1 of P756 (now Table 4 in Draft 9 of the proposed loading guide) was never intended as an across-the-board guide to transformer loading. The specific need this table was intended to address was the problem of stray flux heating found in some large transformers, greater than 100MVA, in general, this is not a problem in transformers smaller than 100MVA.
Olin recommended that the title of Table 1 be changed to make it understood that it is just an example of how one can arrive at the appropriate loading of a transformer.

Subsequent to the discussions, it was agreed to change the title of Table 4. At the end of the meeting, Bill McNutt reworded a title change to Table 4 and a revision of the wording of Section 6.3 of the proposed loading guide that satisfied Olin's concerns.

These changes will be incorporated into Draft 10 of the proposed loading guide.

Linden Pierce indicated that an alternate set of transformer thermal equations was submitted to the Working Group in 1988. These equations can be found in Appendix G of Draft 9 of the proposed loading guide. These equations incorporate oil viscosity change and resistance change as a function of temperature, and are based on top oil temperature.

However, based on recent experimental results, described in his 1991 IEEE paper, Linden became convinced that the transformer thermal equations should be based on bottom oil temperature, not on top oil temperature. A recent IEEE paper by Aubin and Laughame of Hydro Quebec and test data collected by Ed Norton using fiber optic temperature sensors, support the change from top oil temperature based calculations to bottom oil temperatures based calculations.

Linden reports that he is working on a computer program utilizing a new set of thermal equations, based on <u>bottom oil temperature</u>. The program will calculate bottom oil, average oil, top oil, duct oil, average winding, and hottest spot temperature as a function of variable load and ambient temperature cycles. The calculations will include the effects of viscosity and resistance change with temperature. The program will also handle various types of transformer fluids - mineral oil, silicone, and high temperature hydro-carbons.

Linden indicated that the new alternate set of equations and the computer program will be documented in an IEEE paper. This paper has been accepted for presentation at the IEEE IAS Petroleum and Chemical Industry Conference to be held in San Antonio in the fall.

The new alternate equations are expected to be incorporated into the proposed loading guide prior to the next meeting in Cleveland.

The last presentation to the working group was given by Charlie Williams and Steve Smith. Charlie and Steve presented some data from the distribution transformer testing projects being done by ABB and Kuhlman.

These projects, distribution transformers in a laboratory environment, were subjected to various types of load cycles, and their dynamic temperature responses measured and recorded, these thermal responses were then compared against what would be predicted by the standard ANSI loading guide equations.

The comparison data presented by Charlie and Steve indicated that the dynamic responses, predicted by the standard ANSI loading guide equations, track the actual measure response values quite well - within an error range of 5 to 8 percent for the load cycle patterns studied.

They also demonstrate that the predicted responses could be improved if some of the input parameters to the loading guide equations were adjusted. Sensitivity analysis determined that for the load cycles they studied, the dynamic response calculated by the standard loading guide equations were most sensitive to changes to calculated oil rise and the load.

This work, described by Linden Pierce, Charlie Williams, and Steve Smith, is really excellent R&D work needed to support our development of a state-of-the-art Loading Guide.

This double session meeting adjourned at 10:50 A.M.

The second W/G report was given by Bob Grubb, Chairman of the Working Group on Thermal Tests, which met at 1:20 P.M. on March 30, 1992, with 14 members and 34 guests in attendance.

The Chairman reported on the status of Project P838/ANSI PC57.119, Recommended Procedures for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Ratings. As a result of the balloting of Draft 11, extensive changes have been incorporated into Draft 12, which is being mailed to the IEEE Standards Office for reballoting to the Insulation Life Subcommittee and the Main Transformer Committee. It is hoped that the changes will successfully resolve the negative ballots received, as well as reflect the editorial comments. The major changes from Draft 11 are summarized as follows:

1. Section 6 was re-written to change the 100% load test to include additional current to simulate core loss, so it can also serve as a standard temperature rise test.

2. Section 7 was revised to change all symbols to the standard style adopted by the Committee.

3. The loading guide equations in Section 8 were re-written using the new symbols.

4. Four different hottest spot determination alternatives were added to Section 8 to resolve negative ballots that this document did not provide procedures for determining the hottest spot. The methods are mentioned, and it is left to the user and manufacturer to agree on choice of method.

5. Section 8.4 was revised to specify a standard method of evaluating the exponent "n".

6. Revisions to conform to the new IEEE Style Manual.

7. Rewriting of the Tutorial Appendix A, and addition of Appendix B discussing installation of hottest spot detectors.

Project PC57.12.00L, Definition of Thermal Duplicate. The Secretary mailed a survey on tolerance for thermal parameters to the Main Committee, Insulation Life Subcommittee, and the Working Group, approximately one month before this meeting. A Task Force meeting was held on Sunday, March 29, with 16 attendees, to review the results of this survey. The survey was mailed out to 165 individuals, and as of March 27 there were 38 responses. The chairman had also prepared Draft 2 of the definition based on feedback from the ballot of Draft 1. At the conclusion of discussion of Draft 2 at the Task Force Meeting, the Chairman and Secretary, assisted by Barry Beaster and Jim Long, tabulated the results of the survey to arrive at consensus recommendations for the thermal parameter tolerances for Table (8). While there was not a heavy response to the survey, it was felt that there was enough response to proceed.

The Working Group discussion on Draft 2 started with the suggested change for Table 16 of C57.12.00. The two categories, "design" and "other" had been expanded to cover four situations.

1. Thermal test on a new design.

2. Option to eliminate thermal testing when temperature rises may be calculated from results of test on a thermally similar transformer.

3. Option to eliminate test when rises are available from a duplicate rating.

4. Thermal test when specified, regardless of the existence of a duplicate.

There were some questions on interpretation of these categories as written in Draft 2, and these will be reworked before Draft 2 is submitted for ballot.

Linden Pierce made a recommendation that the question of "thermal duplicate" could be eliminated by deleting reference to it in the Table, and listing the temperature rise test as a "design" test,

or as an "other" test when specified by the user. Discussion on this recommendation resulted in the conclusion that there still would be debate between users and manufacturers as to whether a "design" test would be required for a particular transformer, and there would be no guidelines to aid the user in participating in this decision. It was decided to leave in the reference to "thermal duplicate" and proceed with the ballot of Draft 2. While there was some pressure to resolve the issue promptly in order to include it with other proposed changes in a current revision of C57.12.00, it was felt that this change could not be included until it was successfully balloted through the Working Group and Subcommittee.

The consensus of tolerances from the survey were then discussed, and the values proposed for the ballot of Draft 2 are as follows:

- Thermal test losses, external cooling, and winding cooling - ± 15% for <100MVA, and ± 10% for >100MVA.
- Top oil rise and average oil rise - ± 15% for <5MVA, ±15% for >100MVA.
- Winding gradient - ±4°C for <100MVA, ±2°C for <100MVA.
- Winding temperature rise - ±7°C for <100MVa, ±5°C for <100MVA.

In response to some comments, a larger negative tolerance will be considered for winding temperatures rise, particularly for small or medium ratings, where incremental cooling additions can substantially lower temperature rises.

Draft 2 will also include an item on the size and ratings of the pumps and fans on cooling assemblies. Discussion then preceded on suggestions to remove some of the listed thermal parameters based on their interdependences. As the allotted time for the meeting was ending, it was decided to move on with the ballot of Draft 2, in the expectation that these comments would be detailed in ballot responses.

The meeting was adjourned at 2:35 P.M.

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

The Working Group met at 2:50 P.M. on Monday with a total attendance of 40, including 12 Working Group members and 28 guests.

It was announced that the first ballot of the newly drafted "Standard Test Procedure for Thermal Evaluation of Liquid Immersed Distribution and Power Transformers" was mailed to members of the Working Group and the Insulation Life Subcommittee on March 3. The return deadline for this ballot is April 16, and all voting members were reminded to review the new standard test procedure which combines power transformers with the existing C57.100 standard test procedure for distribution transformers.

Lin Pierce commented on several items in the proposed standard test procedure and made recommendations for modifications to the procedure. His first recommendation is to change the title from "Standard Test Procedure for Thermal Evaluation" to "Recommended Practice for Thermal Evaluation". This is based on the fact that the new concepts which have been added to include power transformers necessitate that the document not be mandatory until experience has been obtained and therefore a "Recommended Practice" seems more appropriate. It was suggested that it might be possible to structure a hybrid document that would continue to be a "Standard Test Procedure for Distribution Transformers, but also a "Recommended Practice" for power transformers. The subject will be studied and resolved before the next meeting.

Lin's next point was that there is a disparity between the Distribution and Power Transformer model test requirements with the Power ~~Tran~~ ~~former~~ ~~requirements~~ ~~being~~ more severe. Bill McNutt agreed to forward a suggested modification with his ballot return.

Lin Pierce further commented that the paragraph which defines the criteria for acceptability of a new insulation needs improvement. The present wording implies that the new material must demonstrate an end of life equal to, or greater than, that used for the present system. Bill McNutt also agreed to forward a suggested modification to be reviewed at the next meeting.

Chuck McMillen commented his major concern with the proposed test procedure is that with the new criteria of 180,000 hours minimum life expectancy and a safety factor of two times minimum life, a manufacturer could possibly certify non-upgraded kraft paper as a qualified insulation material.

The ballot results, including comments submitted by those voting, will be available for the next meeting. The Working Group will then begin work to modify the document for a second ballot.

The Working Group meeting adjourned at 4:00 P.M.

The final Working Group report was given by Heinz Fischer, Chairman of the Working Group on High Temperature Insulation for Liquid-Filled Power Transformers.

The Working Group met at 10:55 A.M. on Monday. There were 20 members and 39 guests present.

The chairman reported that since the last meeting draft 3 of the Position Paper was distributed to the W.G. membership and Insulation Life Subcommittee comments were returned, and a draft 4 was sent out for discussion prior to this meeting. The ultimate forum for publication or distribution of the finished paper was discussed, and it was concluded that it should be submitted as a Transactions paper to document the state-of-the-art in application of high temperature insulation in power transformers. First, it must receive approval in the W.G., Insulation Life Subcommittee, and Transformers Committees.

The chairman reviewed the paper section by section and several changes or needs for additions were noted. These will be addressed and draft 5 will be prepared.

A second task, which was discussed, was formulation of a set of insulation system temperature criteria. This would include average winding rise over ambient, hot spot rise over ambient, and top oil rise limits. Possible numbers were discussed, but there is not yet a clear picture of what the ultimate numbers should be. A survey will be made of those who have experience with application of high temperature materials.

The meeting was adjourned at 12:10 P.M.

An item of old business before the Subcommittee was a question raised at the last meeting in Baltimore as to whether dielectric stress, in addition to thermal stress, has an effect on transformer insulation life.

A 1963 paper by Beavers and Lissey, which was attached to the Subcommittee Minutes of the Baltimore meeting, indicated that dielectric stress did affect distribution transformer insulation life. As a result, the thermal evaluation test procedure for distribution transformer insulation systems was changed to be performed at FULL rated voltage instead of impedance voltage.

Comments from the floor in support of some possible effect at higher than normal winding temperatures were given by Bob Vietch of Ferranti, Packard, Vince Dahinden of H. Wiedman and Frank Heinrich.

If dielectric stress is a factor in loss of insulation life, then the question arises as to whether thermal test procedures for overload tests and thermal evaluation tests for power transformers should be performed at full rated voltage instead of impedance voltage.

It was suggested that data that anyone had on this subject be sent to the Subcommittee Chairman for review, after which a report will be prepared and presented at the next meeting in Cleveland.

The Subcommittee Meeting adjourned at 4:15 P.M.

Respectfully submitted

David H. Douglas
Subcommittee Chairman

IEEE

POWER ENGINEERING SOCIETY

TRANSFORMERS COMMITTEE

MINUTES

INSULATING FLUIDS SUBCOMMITTEE

March 30-31, 1992

Birmingham, Alabama

The Insulating Fluids Subcommittee met on Monday morning, March 30, and Tuesday morning, March 31, with 27 members and 41 guests present. On Monday, the working group on PC 57.130 and the subcommittee met simultaneously.

The minutes of the meeting held in Baltimore (November 4-5, 1991) were approved as submitted.

MEMBERS PRESENT:

R. L. Barker
J. L. Corkran
D. W. Crofts
D. H. Douglas
G. E. Forrest
J. Goudie
F. J. Gryszkiewicz
T. J. Haupert
F. W. Heinrichs
R. H. Hollister
B. G. Hunter
R. P. Johnston
E. Kallaur
J. J. Kelly
J. P. Kinney
R. I. Lowe
M. M. McGee
C. P. McShane
C. K. Miller
S. K. Mort
R. J. Musil
H. A. Pearce
G. J. Reitter
T. P. Traub
R. A. Veitch
L. Wagenaar
R. P. Wakeam

GUESTS PRESENT:

R. G. Reddy
O. Heyman
P. T. Feghali
J. V. Ronucchi
C. P. Michel
H. Light
W. Boettger
L. Tauber
W. Saxon
L. Nicholas
H. Lau
J. Bosiger
R. C. Thomas
J. Antweiler
D. Billings
L. Swenson
J. Tuohy
S. Breault
H. J. Sim
R. Delgado
A. W. Bartek
S. Shah
R. Johansson
K. Riordan
E. T. Defur
S. Osborne
K. R. Skinner
J. Foldi
B. Uhl
S. Foss
M. Springrose
G. Sparagowski
J. Long
D. Fallon
V. Thenaysnan
R. J. Wheerty
H. J. Windish
J. Cultera

PROJECTS:

* C57.104 & C57.106 have been approved by IEEE and ANSI and are being edited. They should be published in a few weeks.

* C57.130 - Guide for Gas Analysis During Factory Tests

  Due to the resignation of Caroline Komlenic, Frank Heinrichs has agreed to take over the chair of the Task Force for conducting the survey to gather information on the recommended timing of sampling and the test limits. The survey form was carefully reviewed, and the Task Force will prepare an edited copy. The survey will include the Insulating Fluids Subcommittee and the Main Transformers Committee.

  Chairman of the working group to develop the guide, James Kinney, conducted a review of the written portion of the guide. A new PAR will be requested after the next meeting to change both the title and the scope. Proposals had been submitted to rewrite several sections, particularly those dealing with sampling and procedures. Draft 4 was discussed in depth. The working group will prepare Draft 5 for review prior to the next meeting.

* P1258 - Guide for Gas Analysis on Silicone Liquid Filled Transformers

  Jim Goudie, Chairman of the working group, conducted a review and discussion of the preliminary draft of this guide. The working group will survey as many users as possible to obtain information about the quantity and sizes of silicone filled transformers which are being tested for gas analysis. Questions will also be asked about the frequency of testing and procedures being used. This will be sent to the Insulating Fluids Subcommittee, the Main Transformers Committee, EEI, the Industrial Applications Society, and any other interested group. The working group will prepare a draft of the guide for review.

* Gas Analysis on HMWH Filled Transformers

  Due to the absence of the Chairman, Dave Sundin, no discussion was held at this meeting. However, the working group is recommending that the Gas-Guide for Oil Filled Transformers, C57.104, be followed at the present.

The next meeting will be held October 18-21, 1992 in Cleveland, Ohio.

Henry Pearce
Chairman

IEEE/PES Transformers Committee
Instrument Transformer Subcommittee
Birmingham, Alabama
April 1, 1992

1. The Instrument Transformer Subcommittee meet the morning of March 31, 1992. The meeting started at 8:00 AM. Fourteen (14) members and nine (9) guests attended.

1.1 After introductions of members and guests, the minutes of the previous meeting were approved.

2. The status of C57.13 "Requirements for Instrument Transformers" was discussed. Briefly, another form must be filed with the IEEE Standards Office before the standard can be submitted to the IEEE Standards Committee. This form will be filed as soon as possible to permit the Standards Committee to review it in June.

3. The review of draft 5 of project P832, "Guide for Detection of Partial Discharges and the Measurement of Apparent Charge in Instrument Transformers", was completed. The revised draft will be submitted for review by the subcommittee. If there are no further changes, the document will be ready for ballot by the Transformers Committee.

4. The last hour was devoted to a discussion of voltage and current transducers using electronics and fiber optics. Their relationship to Instrument Transformers and other IEEE Committees was discussed.

4.1 The subcommittee members present voted unanimously to prepare a PAR for preparation of a trial use standard.

5. The meeting was adjourned at noon.

Respectfully submitted,

John N. Davis, Chairman
Instrument Transformers Subcommittee

Minutes of the March 30,1992 Meeting of the HVDC Converter Transformer and Smoothing Reactor Subcommittee Birmingham, AL

Members Present:

V. Dahinden	H. Weidmann AG
R. Dudley	Trench Electric
F. Elliott	B.P.A.
W. Kennedy	ABB Muncie
K. Papp	Trench Electric
V. Pham	ABB Varennes
P. Riffon	Hydro Quebec
W. Stein	Siemens

Members Absent:

D. Allan	GEC Alsthom
F. David	Federal Pioneer
E. Norton	Consultant
S. Okler	Los Angeles Dept. of Water & Power
G. Vaillancourt	IREQ

Guests Present:

R. Iijima	B.P.A.
L. Swenson	B.P.A.
J. Watson	Los Angeles Dept. of Water & Power

Copies to:

J. Borst	ABB Jefferson City
O. Heyman	ABB Components, Ludvika
W. Binder	Ohio Edison
R. Mathews	Baltimore Gas & Electric
E. So	National Research Council
S. Kennedy	Niagara Transformers
S. Kuznetsov	PSM Technologies
S. Nilsson	EPRI
P. Lips	Siemens
D. Sharma	Nova Scotia Electric
A. Lindroth	ABB Ludvika
S. Vogel	IEEE Standards

Minutes of the March 30,1992 Meeting of the HVDC Converter Transformer and Smoothing Reactor Subcommittee Birmingham, AL

The meeting was called to order at 8:00 AM with seven members and three guests present. Copies of the first draft of PC1277 "General Requirements and Test Code for Oil-Immersed and Dry-Type Smoothing Reactors" were distributed. It was noted that for subsequent Transformer Committee meetings we should request that the subcommittee meeting be moved to the second and third time periods on Monday morning, with Richard Dudley's new Dry Type Smoothing Reactor Task Force moved to the first time period.

The next subject for discussion was the calculation of harmonic losses in converter transformers. Fred Elliott presented an analysis performed on BPA's latest Celilo transformers which showed reasonable close agreement between the old IEC formula, the technique described in Forrest's papers, and losses calculated from harmonic loss factors obtained from actual measurements on several manufacturer's converter transformers. This contrasts with an analysis performed by Pierre Riffon from Hydro-Quebec and discussed at our last meeting. It was pointed out that for the BPA units the I^2R losses are only 73% of the total load losses, while for the Hydro-Quebec design they formed 84% of the total. These two analyses show that the basic design of the converter transformer can have a significant influence on the harmonic loss factors (Kn). As a result we agreed to withdraw the table of harmonic loss factors presented in draft 4 (the current draft), and replace it with a discussion permitting the manufacturer to use his own values of Kn in the tender, which would be replaced with actual Kn values for the temperature run. The initial Kn values could be obtained from calculation or be based on measurements on earlier designs, while the Kn values for the temperature run would be obtained from measurements on a transformer from the present design run.

The subcommittee also agreed to accept a proposal by Pierre Riffon concerning partial discharges during the polarity reversal test. The present test calls for holding a dc voltage for thirty minutes and allowing no more than ten partial discharges > 2000 pC during the last ten minutes. We recognized that it is impossible to get meaningful pd measurements during the reversal itself, but also agreed with Mr. Riffon that the observation period should be extended. Consequently, for the new draft the observation period will be extended to the last 29 minutes, and no more than 29 discharges will be permitted to keep the average allowable rate the same.

The new draft will be mailed out by May 30th; members are strongly urged to supply comments on both that document and D1 of PC1277 prior to our next meeting in Cleveland.

Respectfully Submitted

Bill Kennedy

William N. Kennedy
Chairman, HVDC Converter Transformer & Smoothing Reactor Subcommittee

CONVERTER TRANSFORMER HARMONIC LOSS CALCULATIONS
BPA CELILO CONVERTER TERMINAL EXPANSION

MAR 28 1992
F E Elliott

Summary of Load Loss Results

	Per Unit	Percent of IEC 146
IEC 146 Load Loss	1.0000	100.00
Classic Formula	1.2001	120.01

Harmonics 1-31

	VWW		VWD	
	Per Unit	Percent of IEC 146	Per Unit	Percent of IEC 146
DeForest Paper w=0.2	1.1713	117.13	1.1701	117.01
DeForest Paper w=0.3	1.2007	120.07	1.1993	119.93
ABB Curve	1.1821	118.21	1.1808	118.08
Siemens Curve	1.2539	125.39	1.2523	125.23

Harmonics 1-49

	VWW		VWD	
	Per Unit	Percent of IEC 146	Per Unit	Percent of IEC 146
DeForest Paper w=0.2	1.1754	117.54	1.1741	117.41
DeForest Paper w=0.3	1.2058	120.58	1.2044	120.44
ABB Curve	1.1871	118.71	1.1857	118.57

CONVERTER TRANSFORMER HARMONIC LOSS CALCULATIONS
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Transformer ratings	Voltage, kV	Current, A	MVA
Line Winding Tap 5 - L(5)	303.11	702.70	213.00
Valve Winding Delta - VWD	205.30	518.80	106.50
Valve Winding Wye - VWW	118.53	898.50	106.50

Note: The Line Winding is built to two sections with one section wound on each valve winding leg.

Impedances	Percent	Base MVA
L(5) - VWD	12.00	106.50
L(5) - VWW	11.90	106.50

IEC 146 Calculated Operating Currents

Rated Converter Current - Id, Amps	1100.00
I(PA)=I(PB), Amps (Line Side)	351.22
I(PC), Amps (Line Side)	678.50

IEC 146 Winding Currents (1.00 per unit for calculations)

Line Winding Tap 5 - L(5)	678.50 Amps
Valve Winding Delta - VWD	518.54 Amps
Valve Winding Wye - VWW	898.15 Amps

IEC 146 Calculated Load Losses at 85°C (per unit)
Load Losses = 0.035(PA+PB) + 0.93PC

Total Losses	1.0000
I²R Losses	0.7332
Stray Losses	0.2668

Specified Harmonic Currents (Per Unit)

Harmonic Number	VWW	VWD
1	0.9524	0.9525
5	0.1729	0.1726
7	0.1139	0.1138
11	0.0525	0.0521
13	0.0364	0.0362
17	0.0137	0.0134
19	0.0079	0.0078
23	0.0051	0.0053
25	0.0067	0.0068
29	0.0068	0.0068
31	0.0067	0.0067
35	0.0042	0.0041
37	0.0032	0.0031
41	0.0012	0.0012
43	0.0015	0.0016
47	0.0021	0.0021
49	0.0025	0.0026

CONVERTER TRANSFORMER HARMONIC LOSS CALCULATIONS
BPA CELILO CONVERTER TERMINAL EXPANSION

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Classical Formula: PC=PL+FH(PL-I²R)
PC: Load Loss for Converter Operation
PL: Load Loss by IEC 146 Method = 1.00
FH: Harmonic Loss Multiplier = 0.75
I²R: Loss due to winding resistance =0.7332

PC= 1.2001

Deforest Paper Formula
n: Harmonic Number
Kn: Harmonic Loss Factor for Harmonic Number n
Pn: Loss at Harmonic n
P1: 60 Hz loss w/full load sinusiodal current
P0: I²R loss
w: winding stray loss as a fraction of total stray loss

Harmonic Number	w= 0.20 Kn	VWW	VWD	w= 0.30 Kn	VWW	VWD
1	1.00	0.9071	0.9073	1.00	0.9071	0.9073
5	3.90	0.1166	0.1162	4.21	0.1260	0.1255
7	6.14	0.0796	0.0795	6.81	0.0883	0.0882
11	11.94	0.0329	0.0324	13.71	0.0378	0.0372
13	15.45	0.0205	0.0202	17.97	0.0238	0.0235
17	23.62	0.0044	0.0042	28.02	0.0052	0.0050
19	28.25	0.0018	0.0017	33.78	0.0021	0.0020
23	38.57	0.0010	0.0011	46.73	0.0012	0.0013
25	44.24	0.0020	0.0021	53.91	0.0024	0.0025
29	56.58	0.0026	0.0026	69.63	0.0032	0.0032
31	63.24	0.0028	0.0029	78.16	0.0035	0.0035
35	77.51	0.0013	0.0013	96.55	0.0017	0.0016
37	85.12	0.0009	0.0008	106.39	0.0011	0.0011
41	101.26	0.0001	0.0001	127.36	0.0002	0.0002
43	109.78	0.0002	0.0003	138.48	0.0003	0.0003
47	127.73	0.0006	0.0006	161.99	0.0007	0.0007
49	137.15	0.0009	0.0009	174.36	0.0011	0.0012
Total Losses (1-49)		1.1754	1.1741		1.2059	1.2044
Total Losses (1-31)		1.1713	1.1701		1.2007	1.1993

CONVERTER TRANSFORMER HARMONIC LOSS CALCULATIONS
BPA CELILO CONVERTER TERMINAL EXPANSION

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Harmonic Number	ABB CURVE Kn	ABB CURVE VWW	ABB CURVE VWD	SIEMENS CURVE Kn	SIEMENS CURVE VWW	SIEMENS CURVE VWD
1	1.00	0.9071	0.9073	1.00	0.9071	0.9073
5	4.24	0.1267	0.1263	5.00	0.1495	0.1489
7	5.65	0.0733	0.0732	8.20	0.1064	0.1062
11	13.00	0.0358	0.0353	16.00	0.0441	0.0434
13	16.50	0.0218	0.0216	21.00	0.0278	0.0274
17	26.60	0.0050	0.0048	30.30	0.0056	0.0054
19	33.80	0.0021	0.0020	36.00	0.0023	0.0022
23	46.40	0.0012	0.0013	50.00	0.0013	0.0014
25	52.90	0.0024	0.0025	57.00	0.0026	0.0027
29	69.00	0.0032	0.0032	75.00	0.0035	0.0035
31	77.10	0.0035	0.0035	85.00	0.0038	0.0038
35	92.40	0.0016	0.0015			
37	101.00	0.0011	0.0010			
41	121.00	0.0002	0.0002			
43	133.00	0.0003	0.0003			
47	159.00	0.0007	0.0007			
49	174.00	0.0011	0.0012			
Total Losses (1-49)		1.1871	1.1857			
Total Losses (1-31)		1.1821	1.1808		1.2539	1.2523

Montréal, March 12, 1992

ABB POWER T & D COMPANY INC.
Power Transformer Division
3500 South Cowan Road
P.O. Box 2448
Muncie, Indiana
47307-0448

Attention: Mr. William N. Kennedy
Chairman
Converter Transformers and Smoothing
Reactors Subcommittee

Subject: **Comments on PC 57.129/D4, October 1991**
"General Requirements and Test Code of Oil-Immersed Converter Transformers for DC Power Transmission"

Dear Mr. Kennedy,

I am pleased to send you my comments concerning the document PC57.129/D4, Oct. 1991 "General Requirements and Test Code for Oil-Immersed Converter Transformers for DC Power Transmission".

Item 3

As agreed at our last meeting V_d, $V_{dc\ system}$ and V_{vo} should be the maximum rated voltages.

Item 4

Reference (36) should be more documented.

Item 5.1.1

"...when otherwise specified herein,".

Item 6.11.2: I propose the following addition:

"The DC-side winding(s) of converter transformer shall also be designed to withstand stresses resulting from switching impulse tests on the AC side winding. The tap changer position shall be set to get the highest induced voltage on DC-side winding(s)".

.../2

/2

Item 6.11.5.1: I suggest to change

"Waveshapes for the full and chopped wave are defined...."

for

"The lightning impulse test procedure is described..."

Item 6.11.5.2: I suggest to change

"Waveshapes fo the switching impulse test are defined..."

for

"The switching impulse test procedure is described..."

Item 6.11.6

I suggest to change the last sentence of the first paragraph to "the test voltage is given by..."

Item 6.11.7

As agreed at our last meeting the title of figure 3 should be changed to DC Polarity Reversal Test.

Item 6.11.8.2

a) To be meaningful, the AC Applied Voltage Test should be performed with partial discharge measurements.

b) As agreed at our last meeting, the "1.05 factor" applied on AC voltage component should be removed if V_{vo} is defined as the maximum rated phase-phase AC voltage.

Table 1: As discussed at our last meeting.

a) Dielectric tests: We should put "Chopped Wave Test" under "Full Wave" and add a new item "Switching Impulse Test". Those tests should be specified as routine tests.

b) Audible sound level: This test should be a design test.

c) Short circuit capability (8)

d) "Vibration" should be deleted.

.../3

/3

Table 2: Tolerances for losses of smoothing reactor should be deleted.

Item 9.6.2.2

I do not agree to put table 3 as "official harmonic loss multipliers". Those multipliers vary from one design to another and are mainly influenced by the ratio between the stray losses in the winding and the stray losses in the other metallic parts (core clamps, tank, magnetic shunts etc...). This ratio vary from one manufacturer to another. This ratio depends mainly of the design philosophy used by the different manufacturers.

Because the load loss penalties might be an important economic factor and in order to obtain a fair competition between different manufacturers and/or designs, we should give an accurate method to calculate those losses. The calculation method should not be dependant of a particular design (in this case, A.B.B. design).

For this reason, I propose to measure on the first unit of each order the actual harmonic loss multipliers. I suggest to prescribe the measuring method used in "J. Alan Forrest's" paper. This method is simple and the measuring equipements involved are not so expensive. Those measurements will be also useful for the determination of watt losses to be used during the heat run test.

Item 9.7.1.1

a) I suggest to change the title to "Dielectric tests".

b) I suggest to remove words "in the factory"

Item 9.7.1.3 subnote 1

The insertion of the resistor in serie with the chopping gaps may decrease the collapse time of the chopped wave. A too long collapse time will reduce the severity of the test.

IEEE STD4-1978 doesn't specify any maximum collapse time. Stresses imposed on winding(s) will vary with the collapse time. For this reason, we should either specify a maximum collapse time or forbid the use of serie resistor.

Item 9.7.1.3 subnote 2

Words related to smooting reactor should be deleted.

.../4

/4

Items 9.7.1.4 and 9.7.1.4.1

Word "Factory" should be deleted.

Item 9.7.1.4.2

For practical reason, I suggest to extend the range of oil temperature for DC Voltage Test to 10 °C - 30 °C.

Item 9.7.1.6

I do not agree with the procedure described for DC Field Test. This procedure may lead to mistake when selecting the test voltage, particulary on multiwinding transformer. I suggest that DC Field Test voltage should be between 80 % and 100 % of the DC voltage used during routine tests. The duration of DC Field Test should be long enough to get a good DC voltage distribution. I suggest to specify a minimum duration of 30 minutes.

Item 9.7.4.3

For practical reason, we should permit to ground the tested terminals during the reversal period if the total time for full reversal is fullfilled. Some HV rectifiers need to be grounded before the polarity reversal in order to discharge the capacitors installed on the rectifier. Reversing the polarity without discharging the capacitors may damage the rectifier.

Item 9.7.4.5

For our Radisson project, Hydro-Québec has specified a partial discharge measurement during the last 30 minutes of the test. The number of discharge pulses ≥ 2000 pC during this period shall be less than 30. I think that a longer evaluation period is more practical and is more meaningful for evaluating the trend of partial discharge pulse rate. The proposed measurement time associated with the proposed maximum pulses give the same average partial discharge rate as written in the draft (≤ 1 discharge pulse/minute).

With this proposal, the extension time shall be 30 minutes and only one extension period shall be permitted.

.../5

/5

Item 9.7.5.4

Hydro-Québec has specified, for the Radisson project, a maximum number of discharge pulses for the polarity reversal test. The criteria was less than 29 discharge pulses ≥ 2000 pC during the last 29 minutes of the test. Our experience showed that number of discharge pulses during the reversal itself (2 minutes period) might be important. We think that those discharges had two sources. The transformers itself and the operation of the DC source. We believe that most of the discharge pulses recorded during this time came from the source operation (relays, contactors, etc...) because very few acoustic pulses coming from ultrasonic sensors installed on the tank have been recorded. Nervertheless, 1 minute after this reversal period, the number of discharge pulses were not higher than the acceptable level. Based on that, I think we should specify a success criteria for the number of discharge pulses measured after the reversal period. I proposed the following paragraphs.

"Failure may be indicated by the presence of smoke and bubbles rising in the oil, and audible sound such as a thump, a sudden increase in test current, or in the inability of the power supply to maintain a DC voltage.

In terms of interpreting the partial discharge measurements, the results shall be considered acceptable and no further polarity reversal tests required when during the last 29 minutes of the test, no more than 29 pulses over 2000 pC are detected. Because some discharge activity is normal during polarity reversal, the partial discharge counting during the first minute after completion of the last polarity reversal shall be disregarded.

When no breakdown occurs, and unless very high number of partial discharge pulses exceeding 2000 pC are detected and sustained for a long time, the test is considered as non-destructive. A failure to meet the partial discharge criterion shall therefore not warrant immediate rejection but lead to consultation between purchaser and manufacturer about further investigation.

It is recommanded to conduct the polarity reversal test with ultrasonic transducers installed on the converter transformer tank. Those transducers may help to distinguish internal or external discharges".

/6

Item 9.7.6.1: I suggest to add:

"It is recommanded, prior to the induced test, to energize at 1.10 x nominal voltage and nominal frequency for 3-6 hours the transformer in order to remove the remaining DC trapped charges produced by previous DC tests. Those DC trapped charges may give random high level (> 1000 pC) discharge pulses associated with acoustic detection during the induced test. Grounding of windings for a long period (24 hours) may not be sufficient to remove DC trapped charges".

Item 9.7.6.3.4

As discussed for item 6.11.8.2, the applied AC test should be (to be meaningful) conducted with partial discharge measurements. The maximum partial discharge level shall be less than 500 pC.

Item 9.7.7.1: I suggest to add:

"Attention should be given to high level(> 1000 pC) discharge pulses during induced test. When those pulses are associated with acoustic emission, the discharge source is internal. In terms of interpreting the partial discharge measurements, the results shall be considered acceptable and no further induced test required when the average partial discharge level is less than 500 pC and the average rate of high level discharge pulses (> 1000 pC) associated with acoustic detection is less or equal to 1 pulse per minute.

If the number of high level discharge pulses exceeds the acceptable limit, the transformer shall be subject to another preconditionning AC period as describes in 9.7.6.1 and the induced test shall be repeated.

Item 9.8

The correction factor used to take into account the extra losses produced by harmonic currents shall be calculated in accordance with section 9.6.2.2. I think we should advise users that the heat run test, as described, will not produce the same hot spot rise as it will in normal service. The extra losses produced by harmonic currents are mainly concentrated in extreme ends of windings. The correction factor applied during the heat run test will generate extra losses uniformly distributed along the windings. The hot-spot generated by this test procedure is less than the hot-spot in normal converter operation.

.../7

/7

Item 10.3: I suggest to add:

"The maximum particle count specified in service shall be less or equal to the particle count used during design and routine tests".

Hoping that these comments will help you for your next draft, I remain.

Yours truly,

PIERRE RIFFON
Test specialist
Service Fabrication
Direction Postes

PR/FC

c.c. D. Bélanger
G. Désilets

IEEE PES TRANSFORMERS COMMITTEE

DRY TYPE TRANSFORMER SUBCOMMITTEE

MEETING MINUTES

BIRMINGHAM, ALABAMA - March 31, 1992

Chairman: Mr. W. F. Patterson, Jr.

1. Chairman Remarks and Announcements

The Dry Type Transformer Subcommittee met at 2:00 PM with 26 members and 16 guests present. The first order of business was the approval of the minutes of the 11/05/91 meeting in Baltimore. The minutes were approved as written.

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

Sec.2	Dry Type Reactors	R. Dudley
Sec.3	Specialty Transformers	M. Cambre
Sec.4	Test Code Revision	D. Barnard
Sec.5	Cast Coil Loading Guide	L. Pierce
Sec.6	Thermal Evaluation & Flammability	R. Provost

1.2 Following Mr. Dudley's presentation a discussion ensued regarding their proposed use of the thermal time constant to establish the end point criteria for terminating heat runs. The suggested end point is 5 times the thermal time constant of the actual unit under test. This is a novel approach to overcome deficiencies using thermometers or thermocouples and the impact of the room size in which the test is performed. The time constant might be established by direct measurement at the conclusion of the heat run.

1.3 Mr. Cambre reported the ballot status on IEEE 259. No major obstacles were evident to this having been a successful ballot. One negative ballot returned by Mr. Mayschak of UL as a representative of ANSI does not impact the balloting of the IEEE Transformers Committee but would still be addressed as any other negative ballot.

1.4 Mr. Provost made a request during his presentation that any members of the Subcommittee having any additional information or knowledge of literature concerning flammability please submit them for inclusion in the bibliography he is preparing.

1.5 New Business

1.5.1 The Chairman announced the following future schedule for meetings of the Transformer Committee:

Cleveland, OH	10/18/92 - 10/21/92
Portland, OR	03/28/93 - 03/31/93
St.Petersburg, FL	10/30/93 - 11/01/93
Dallas, TX	Spring, 1994
Milwaukee, WI	Fall, 1994
Kansas City, KS	Spring, 1995

The ~~Transformers Committee is seeking sponsors~~ for meetings in the Fall of 1995 and the Spring of 1996. Contact Mr. John Borst, Chairman of the IEEE Transformers Committee.

1.5.2 The status of the ANSI standards being transferred into the Dry Type Subcommittee was discussed. Four standards are involved; C57.12.50, C57.12.51, C57.12.52, and C57.12.55.

They all received a negative vote for transfer. Mr. Jonnatti discussed his negative vote. Following considerable discussion and noting that ANSI review and approval will still be required for these documents to be published as ANSI standards, Mr. Jonnatti agreed to withdraw his negative vote for transfer.

On C57.12.55 there was 1 negative ballot for reaffirmation. This negative was primarily concerned that this standard dealt mainly with the enclosure construction requirements and that the Transformers Committee was perhaps not the appropriate place for it's development. The Chairman noted that following a telephone discussion explaining the circumstances for this document being assigned to IEEE, the individual agreed to withdraw his negative.

The Chairman also noted that all 4 documents had one other negative for reaffirmation from Mr. Uptegraff. Mr. Uptegraff explained his rationale was that the documents have existed for about 10 years and might need a thorough evaluation prior to reaffirmation. Following discussion Mr. Uptegraff agreed to withdraw his negative ballot.

In summary, the above actions resulted in all negatives concerning the 4 documents being withdrawn.

1.5.3 The Chairman discussed a new IEEE requirement that a copyright statement be put on all drafts and on every page of the drafts. A question was raised at the WG Chairmans meeting on Sunday regarding the legality of this. The Chairman presented this concern at the Administrative Subcommittee meeting on Monday. He was assured that it is legal to apply a copyright statement without pre-submitting it the U.S. Copyright Office.

The difficulty of putting this statement on every page was discussed. It was suggested that since most documents are now processed on word processors, simply adding the statement to the page footer would not present any undue burdens.

1.5.4 The possible need for a new impulse guide for only dry type transformers was discussed. This was a topic presented by Mr. Jonnatti at Mr. Barnard's WG.

During the discussion it was noted that all examples discussed in the current guide are based on liquid filled units. No discussions within the text of the existing guide address the unique characteristics of dry type transformers.

A poll of the members present revealed that none were involved with the revision of the existing impulse guide. This was mainly due to schedule conflicts which prevent most dry type members from attending the impulse guide WG.

Possible expansion of the impulse chapter within C57.12.91 was discussed. It was noted that the size of this document might be prohibitive to expanding it to include "guide" recommendations.

No resolution of this issue was decided upon.

1.5.5 Mr. Barnard noted that the Performance Subcommittee was creating a working group to resolve negation ballots on C57.110. Mr. Cambre, the working group Chairman, noted that a 1 year extension was granted for the document while this activity was taking place. Members were encouraged to participate in this working group.

1.6 The meeting was adjourned at 4:30 PM.

Following the meeting Mr. Don Kline provided a very informative tutorial on harmonics present in rectifier transformers during the various modes of operation. The Subcommittee expresses it's sincere appreciation to Mr. Kline for his gracious sharing of this knowledge with the Subcommittee membership.

1.7 Attendance Roster

MEMBERS PRESENT

B. Allen
R. Bancroft
D. Barnard
A. Bimbiris
M. Cambre
R. Dudley
J. Frank
R. Gearhart
M. Haas
R. Hayes
C. Johnson
A. Jonnatti
S. Kennedy
A. Kline
R. Marek
M. Mitelman
K. Papp
W. Patterson (Chairman)
P. Payne
L. Pierce
G. Pregent
R. Provost
R. Simpson
J. Sullivan
R. Uptegraff
H. Windisch

MEMBERS ABSENT

T. Darr (NEMA Liaison)
E. Koenig
Y. Musa (SPDC Liaison)
W. Mutschler
V. Thenappan

GUESTS PRESENT

K. Carpenter
T. Clark
J. Goudie
C. Hancock
W. Hanson
T. Holdway
P. Hopkinson
D. Kinney
L. Kirchner
W. Morehart
C. Paradis
D. Purohit
M. Rajadhyaksha
S. Shah
R. Thomas
T. Thompson

ATTENDANCE SUMMARY

	Present	Absent
Members:	26	5
Guests.:	16	

Prepared by:

Wesley F. Patterson Jr, Chairman
Dry Type Transformer Subcommittee
June 21, 1992

2. Working Group on Dry Type Reactors

Chairman: Mr. Richard Dudley

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

This working group participates as a task force in the activities of the Shunt Reactor Working Group chaired by Mr. J. McGill. The working group provides recommendations relating to dry type reactors as distinguished from liquid-filled reactors. The working group is currently undertaking revisions to C57.16.

2.1 The working group met on 03/30/92 at 2:50 PM with 8 members and 7 guests present. Following circulation of the attendance list, the minutes of the 11/04/91 meeting were approved as written.

2.2 Input from the Dry Type Reactor WG into the drafting of "General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for D.C. Power Transmission" was discussed.

Originally one standard was to cover smoothing reactors and converter transformers for HVDC applications. However it was decided to make a split in order to produce more meaningful documents. Mr. W. Kennedy, Chairman of the HVDC Converter Transformer and Smoothing Reactor Subcommittee, has now prepared a first draft of the smoothing reactor portion.

It has been agreed that a Task Force of the Dry Type Reactor WG will provide inputs to Mr. Kennedy's Subcommittee on the dry type smoothing reactor portion. It has also been agreed with Mr. Kennedy that the Task Force will meet on the first Monday morning session and Mr. Kennedy's Subcommittee will met in the second and third sessions. Membership in the Task Force will be voluntary as not all Dry Type Reactor WG members have an interest in HVDC smoothing reactors.

2.3 The rest of the meeting was devoted to discussions of draft D4 of C57.16. The following are the highlights:

2.3.1 It was decided to keep Appendix A dealing with construction and installation basically as is. Some more detail will be added in sections dealing with terminals, LA's, and breakers (SF6). However a reader requiring more detail will be able to do so using an augmented list of references in the Bibliography. These will consist of selected technical papers and pertinent IEEE and IEC guides.

2.3.2 Increasing the number of full wave impulses from 2 to 3 was accepted. This is in line with other IEEE standards.

2.3.3 It was agreed that the switching surge test will be performed on the support structure (insulator) only and for system voltages 230 KV and above. Table 5 will be modified accordingly. The wave shape of the test will be 250/2500 microseconds.

Performance of the switching surge test under wet conditions was discussed extensively. The rationale for considering the test is to assess the effect of the reactor and auxiliary parts of the support structure on wetting of the support insulators and hence their withstand. The major issue centered on how to do the test. IEEE Standard #4 will be consulted. If it is decided to introduce this test it will be classified as "OTHER".

2.3.4 It was decided that the short circuit mechanical peak (including offset) will be 2.55, or to be in line with IEC, or will be specified by the end user.

2.3.5 Section 11.5.6.8 dealing with end of heat run criteria was discussed. IEC will be consulted. It was suggested that the minimum duration of a heat run be 5 times the thermal time constant of the reactor under test.

2.3.6 Section 8.3.4 dealing with terminal temperature rise was discussed at length. It was ultimately suggested to include a reference to A.5 as well as adding a note that the end user should consult the manufacturer regarding the recommended type of connector or connection at the bid stage.

2.3.7 Temperature rise limits in Table #4 will be modified to meet the requirements of IEEE Standard #1. The table will essentially be the same as the one in C57.21-1990. Notes will be added to cover the fact that series reactors are load cycled and hence allowed temperature rise limits could be higher under certain specified operating conditions.

2.3.8 Correct 4.1.2:

"9) Operation of the system with one phase conductor grounded"

2.3.9 Section 5.1 was discussed and it was agreed to eliminate KVA as a basis of rating as it has no real meaning in terms of specifying a series reactor. Section 2.6.1.1 dealing with nameplate data will be modified accordingly.

2.3.10 The formulas and sample reactor rating calculation will be moved to an appendix. The IEEE Dictionary and the ANSI guide for short circuit calculations will be consulted regarding consistency of symbols. It will also be clarified that the calculation is on a 3 phase basis.

2.3.11 Modify section 5.5.1.3:

"The mechanical short time current rating shall be expressed in maximum crest asymmetrical amperes. This maximum value will be as specified in Section 10.2.2."

2.3.12 For consistency, and in consideration of the current focus of the revised standard, the descriptor "current limiting" should be eliminated and "series reactor" or "reactor" used throughout the document.

2.3.13 Section 6.2.5 covering definition of tests should be moved to the beginning ~~of Section~~ 6.2.

2.3.14 For brevity the wording "only when specified" should be eliminated from Table #3.

2.3.15 Sections 6.2.2 and 6.2.3 should be made consistent with Table #3.

2.3.16 Modify Section 6.2.4:

"Other tests for reactors, when requested, will be treated as a design test unless otherwise specified."

2.3.17 Section 7.1.1 dealing with tolerances on losses was discussed. It was decided to make the section covering tolerances on losses for commercial reasons a 'note' in order to maintain the technical emphasis of a standard and still provide the reader with all relevant information.

It was also discussed if there should be a tolerance on average losses.

2.3.18 Section 7.1.1.2 required a modification to the second paragraph:

"If any unit...."

2.3.19 It was decided to modify Section 11.5.3. The exponent in the formula will be 1.6 to be consistent with other standards. A note will be included discussing the possible use of other values ranging up to 2.0.

2.3.20 Modify Section 8.4.2:

"...determined by thermocouple, fiber optic probe, or thermometer. The latter two devices should be used when the use of thermocouples pose a hazard due to high voltage."

2.3.21 Correction to Section 8.4.1, second note:

"...connectors are not supplied...".

2.3.22 Modify Section 10.1.1 regarding 3 second short circuit duration to be consistent with Section 5.2.2.3.

Section 10.1 will be redone to better describe in general terms short circuit capability and testing.

2.3.23 Equation 11.4.1.2b in Section 11.4.1.2 is missing the square root sign.

2.3.24 Section A.2 of Appendix A was modified:

"...National Electrical Safety Code (ANSI C2) or local operating code..."

"...are not enclosed in a grounded tank all parts..."

2.4 The Chairman thanked all members for their contributions and agreed to produce Draft D5 prior to the Cleveland meeting. In it he will include all changes discussed above recent inputs from Messrs Polovick and Papp.

2.5 The meeting was adjourned at 5:50 PM.

2.6 **Attendance Roster**

MEMBERS PRESENT	MEMBERS ABSENT
R. Dudley (Chairman)	R. Allustiarti
S. Kennedy	M. Altman
F. Lewis	J. Erlingsson
K. Papp	R. Jonas
P. Payne	G. Polovick
P. Riffon	M. Sharp
J. Watson	S. Silberman
J. Wood	R. Stojanovic
	T. Traub
	R. Uptegraff
	R. Whearty

GUESTS PRESENT
T. Clark
J. Frank
J. Gassaway
A. Jonnatti
M. Lau
D. Purohit
T. Thompson

ATTENDANCE SUMMARY

	Present	Absent
Members:	8	11
Guests.:	7	

3. Working Group on Specialty Transformers - P259

Chairman: Mr. Max Cambre
Secretary: Mr. R. W. Simpson, Jr.

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

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

3.1 The working group met on 03/30/92 at 1:20 PM with 7 members and 13 guests present. Following the introductions of those present, the minutes of the 11/04/91 meeting were approved as written.

3.2 Balloting of the Transformers Committee on P259/D8 was reviewed:

Ballots Eligible	141	
Ballots Returned	114	81% of Eligible
Approved	96	84% of Returned
Abstentions	15	16% of Returned
Negatives	3	3% of Returned

The negative ballots were reviewed as follows.

3.2.1 Mr. L. Tauber was present to discuss his negative ballot. After discussion of his comments, Mr. Tauber withdrew his negative vote to be confirmed in writing to the Chairman, Mr. Cambre.

3.2.2 Mr. B. H. Ward's negative vote was discussed. It is the consensus of the WG that his concern is adequately addressed within the Scope and Introduction of the standard. Mr. Cambre will contact Mr. Ward to resolve the negative vote.

3.2.3 Mr. J. W. Howard cast a negative vote addressing the use of "should" versus "shall" within the text of the Standard Test Procedure. Mr. Cambre will contact Mr. Howard to resolve these editorial comments.

3.2.4 After the anticipated resolution of the negative ballots, Mr. Cambre expects to notify IEEE that P259 is approved.

3.3 There was one other negative response. Although not a member of the Transformers Committee, Mr. R. J. Mayschak of UL cast a negative vote even though he had earlier approved it with comment as a member of the WG. Mr. Mayschak will be contacted by Mr. Simpson, the WG Secretary, to review his comments as addressed at the last WG meeting in Baltimore.

3.5 The meeting was adjourned at 2:35 PM.

3.6 Attendance Roster

MEMBERS PRESENT

R. Bancroft
D. Barnard
M. Cambre (Chairman)
J. Frank
R. Provost
R. Simpson (Secretary)
R. Uptegraff

MEMBERS ABSENT

R. Mayschak

GUESTS PRESENT

R. Chadwick
J. Davis
T. Holdway
A. Jonnatti
A. Kline
W. Morehart
S. Mort
W. Patterson
D. Purohit
M. Rajadhyaksha
L. Tauber
R. Thomas
T. Thompson

ATTENDANCE SUMMARY

	Present	Absent
Members:	7	1
Guests.:	13	

4. Working Group on Test Code PC57.12.91

Chairman: Mr. David Barnard
Secretary: Mr. Henry Windisch

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

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

4.1 The working group met on 03/30/92 at 10:55 AM with 20 members and 11 guests present. Following the introductions of those present, the minutes ~~of the 11/04/91 meeting were approved as~~ written.

4.2 The Chairman stated that Draft D4 had again been sent out for ballot. Ballots are due by 05/22/92 as established by the Chairman with the approval of the WG. Thirty (30) ballots were sent out. Mr. Guy Pregent did not receive a copy. His name was inadvertently left off the membership list.

The Chairman expressed appreciation to Mr. Lin Pierce for his work in assembling Draft D4 into a consolidated document from the miscellaneous sections provided by the Task Forces.

4.3 Mr. Hollister announced that we would proceed with our old revisions to Chapter 9 since the liquid filled standard revisions are not yet finished. Mr. Hollister will coordinate his revisions with Mr. Henning.

4.4 The Chairman noted that a letter had been written to Ms. Sue Vogel requesting that this standard be reaffirmed. If this reaffirmation is successful there will be more time to complete the working group effort.

4.5 The Chairman noted that on page 97, the last line, the letter 'L' should have a subscript letter of capital 'A'.

4.6 The Chairman reminded the working group members of their responsibility to vote on each ballot. A very poor response was received on the last ballot and was attributed to the condition of Draft D4. A minimum 75% return is necessary to have a valid ballot.

4.7 Figure 20 on page 36 was discussed. Mr. Max Cambre indicated that the figure is not yet correct. This working group will utilize the sketch being considered by Mr. Henning's WG, when it is finally accepted. Since Mr. Cambre is knowledgeable of the content of that sketch, he agreed to wait until that work is completed before further commenting.

4.8 Mr. Don Kline asked if low frequency tests are defined. They are defined on page 48.

4.9 Discussion was held about completing temperature testing on all 3 legs within the specified time period. Although several opinions were voiced, the final outcome will have to be addressed during the balloting.

4.10 Mr. Ben Allen indicated the figure on page 71 should be #33 not #32. Also Mr. Allen suggested other editorial improvements.

4.11 Questions were brought up and discussed regarding the need for an impulse guide and partial discharge guide. No final resolution was reached but members should consider these items while reviewing the standard.

4.12 Mr. Lin Pierce called attention to page 101 where reporting of test data is covered. Mr. Patterson believes this reporting would better fit as an appendix. No final resolution was reached, although it appeared that this section would remain as part of the text.

4.13 Mr. Guy Pregent requested that his name be included back on the member list. Mr. Sheldon Kennedy requested membership on the working group.

4.8 The meeting was adjourned at approximately 12:05 PM.

4.9 Attendance Roster

MEMBERS PRESENT

B. Allen
R. Bancroft
D. Barnard (Chairman)
M. Cambre
J. Frank
M. Haas
R. Hayes
T. Holdway
R. Hollister
C. Johnson
A. Jonnatti
A. Kline
R. Marek
W. Patterson
L. Pierce
G. Pregent
M. Rajadhyaksha
J. Sullivan
R. Uptegraff
H. Windisch (Secretary)

MEMBERS ABSENT

R. Gearhart
C. Kirsch
E. Koenig
M. Mitelman
W. Mutschler
J. Nay
R. Provost
W. Schwartz
R. Simpson
T. Singh
V. Thenappan

GUESTS PRESENT

J. Bonucchi
G. Brooke
K. Carpenter
J. Huddleston III
S. Kennedy
L. Kirchner
R. Nordman
C. Paradis
D. Purohit
E. Sapp
J. Tuohy

ATTENDANCE SUMMARY

	Present	Absent
Members:	20	11
Guests.:	11	

5. Working Group on Cast Coil Loading Guide

Chairman: Mr. Linden Pierce

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

5.1 The working group met on 03/31/92 at 9:30 AM. There were 14 members and 11 guests present. Following the introductions of those present, the minutes of the 11/05/91 meeting were approved as written.

5.2 The WG ~~members agreed to request a change in the~~ meeting schedule to the first session on Tuesday to avoid conflicts.

5.3 The Chairman noted that the PAR was approved by the IEEE Standards Board in December, 1991.

5.4 The Chairman noted that Draft D1 of the Cast Coil Loading Guide was completed and mailed to the WG members on March 6, 1992.

Future plans are as follows:

Final comments on D1	05/01/92
Other comments for D2	08/14/92
Draft D2 completed	09/15/92

The intent is to move rapidly. Plans are that Draft D2 will be an almost complete Loading Guide. After review by the WG at the October 1992 meeting, the balloting process will begin in 1993. Plans are to finish the balloting process and submit the document to the IEEE Standards Board at the end of 1993.

5.5 Draft D1 was reviewed. Written comments from Mr. W. Patterson were addressed first.

5.5.1 Current plans are to issue a Part II of C57.96 for cast resin units. The question was about duplicating parts of Part I. This will be deferred until Part II is complete.

5.5.2 Short time loading was discussed. Draft D2 will address loading above 2 times rating such as motor starting.

5.5.3 An equation for time constants or recommended values will be a major challenge. This will be addressed in Draft D2.

5.5.4 Mr. Stan Osborn of Doble raised a question about the terminology on temperature limitations in Table #1. Currently the terms "without risk" and "with risk" are used. This was discussed at length. Better terminology will be considered for Draft D2.

5.5.5 Other comments were noted by the chairman for incorporation into Draft D2.

5.6 The meeting was adjourned at 10:42 AM.

5.7 **Attendance Roster**

MEMBERS PRESENT	MEMBERS ABSENT
B. Allen	D. Barnard
R. Bancroft	R. Gearhart
A. Bimbiris	R. Goethals
J. Frank	R. Grant
M. Haas	A. Jonnatti
R. Hayes	E. Koenig
M. Iman	T. Lanoue
C. Johnson	G. Marowski
W. Patterson	W. Mutschler
L. Pierce (Chairman)	R. Simpson
G. Pregent	
M. Rajadhyaksha	
J. Sullivan	
H. Windisch	

GUESTS PRESENT
K. Carpenter
D. Dohnal
S. Foss
P. Hopkinson
R. Marek
S. Mort
S. Osborn
C. Paradis
R. Provost
D. Purohit
T. Thompson

ATTENDANCE SUMMARY

	Present	Absent
Members:	14	10
Guests.:	11	

6. Working Group on Thermal Evaluation of Dry Type Transformers
Working Group on Flammability Issues

Chairman: Mr. Richard Provost

This working group has been charged with developing C57.12.60, the thermal evaluation guide for cast coil transformers. The work on this standard has been mostly completed and the standard was submitted to be issued for trial use. Trial use was employed due to the WG being unable to define an existing 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.

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

6.1 The working group met on 03/31/92 at 10:55 AM. There were 11 members and 16 guests present. Following the introductions of those present, the minutes of the 05/14/91 meeting were approved as written.

The Chairman noted that the membership roster included flammability issues as defined by the working group scope established in April 1989.

6.2 The Chairman noted that the final draft of C57.12.60 had been sent to the Standards Board.

The Chairman also noted that ANSI/IEEE C57.12.56 was to be sent to the Transformers Committee to ballot it's members for reaffirmation. Mr. Wes Patterson agreed to initiate the request.

6.3 On the issue of flammability the Chairman noted that a first draft of a bibliography of flammability literature is in the process of further updating and a revised version will be sent to working group members and guests.

The chairman noted that the final draft of CENELEC HD 464 S1, "Trail Use Guide for Special Tests to Prove Suitability to Fire Behavior Classes" for dry type power transformers has been approved for publication, which is expected to occur by the end of 1992. Excerpts from the document were reviewed for the working group. It is expected that this standard will be adopted into the IEC standards for dry type power transformers.

6.4 The meeting was adjourned at 11:30 AM.

6.5 Attendance Roster

MEMBERS PRESENT

B. Allen
R. Bancroft
M. Cambre
V. Dahinden
J. Frank
A. Kline
R. Marek
W. Patterson
L. Pierce
R. Provost (Chairman)
R. Simpson

MEMBERS ABSENT

D. Barnard
J. Nay
R. Uptegraff

GUESTS PRESENT

D. Billings
K. Carpenter
J. Cultrera
S. Foss
M. Haas
R. Hollister
S. Kennedy
M. Mitelman
C. Paradis
P. Payne
G. Pregent
D. Purohit
M. Rajadhyaksha
D. Rolling
R. Stoner
T. Thompson

ATTENDANCE SUMMARY

	Present	Absent
Members:	11	3
Guests.:	16	

IEEE POWER ENGINEERING
TRANSFORMER COMMITTEE
DISTRIBUTION TRANSFORMER SUBCOMMITTEE

MEETING MINUTES

Wynfrey Hotel, Riverchase Galleria, Birmingham, Alabama
March 31, 1992, 2:05 pm

Present:

Jerry C. Thompson	Duke Power Company
George Henry	Central Moloney
J. Ed Smith	Central Moloney
Ken Hanus	T. U. Electric
Glenn Andersen	Duke Power Company
William A. (Al) Maguire	Entergy Services, Inc.
Alan L. Wilks	ERMCO
Jerry Corkran	Cooper Power Systems
Robert Schen	General Electric
Tom Diamantis	Niagara Mohawk
Ron Jordan	San Diego Gas & Elec
Dorman Whitley	ABB Power T&D Company
Dudley L. Galloway	ABB Power T&D Company
John Hunt	Kentucky AEC
Matt Mingoia	Edison Electric Inst.
Jim Antweiler	Square D Company
Scott Wilson	Philadelphia Elec. Co.
Gilbert Kozer	Hevi-Duty Electric
Dennis Geilach	Salt River Project
Charles Williams	Florida Power Corp.
Ali A. Ghafourian	Cooper Power Systems
Clyde Pearson	T. U. Electric
Dave Lyon	Wisconsin Electric Power
Miguel Valbuena	Florida Power & Light
Bruce Uhl	Commonwealth Edison
Tom Balgis	Virginia Power
Richard Hollingsworth	Howard Industries
Ramon Garcia	PROLOC
Ralph Wakeam	Simens Energy & Automation
John Lazar	Northern States Power
Ronald J. Stahara	Kuhlman Corp.
Makesh Sampat	General Electric
Kevin Edwards	Hevi-Duty Electric
John Rossetti	MLG&W
Rick Anderson	Carolina Power & Light
Leon Plaster	ABB Power T&D
John Davis	

PRESIDING OFFICER: GERRY A. PAIVA

CHAIRMAN'S REMARKS AND ANNOUNCEMENTS:

1. The meeting convened at 2:05 pm in the Riverchase B Room with an introduction of the members and guests and the signing of the attendance roster. An explanation of Chairman Frank Steven's absence from this meeting and future availability was given. Frank will be leaving the Chairmanship of this committee due to

2. The Minutes of the Baltimore, Maryland meeting were reviewed and approved by the subcommittee without change to the original document.

3. Matt Mingoia of EEI gave a report of the ADCON meeting (SC ADMINISTRATIVE). Among the topics of the report were:

   a. Discussion of the Enclosure Integrity Working Group and how the process of it coming under the secretariat of the IEEE is progressing. The next meeting in Cleveland will be used to review the progress.

   b. The Executive Committee of C57 is doing their previously agreed review of the move of the Distribution Transformer Subcommittee to IEEE. This was part of the agreement with NEMA on the move. The review was to take place two years after the change.

   c. Next meeting sites: Fall: 1992-Cleveland, October 18 start
   Spring: 1993-Portland, March 28 start
   Fall: 1992-St. Peter, October 30 start
   Spring: 1994-Dallas/Ft. Worth
   Fall: 1994-Milwaukee
   Spring: 1995-Kansas City

   d. FYI: Chairpersons from IEEE Subcommittees can volunteer to do panels at winter/summer power meetings. This being viewed as one of the advantages of Chairmanship.

WORKING GROUP REPORTS:

1. **C57.12.20 REPORT:** (OVERHEAD TRANSFORMERS, POLE MOUNTED)
Chairman - Jerry Thompson

This document was last published in 1988 and is due for republishing in 1993. The working group met on Monday. This standard is well on its way in the process of being prepared for republishing in 1993. Draft III was reviewed at the meeting on Monday. The major issue resolved was the bracket-mounting-strength guideline.

2. **C57.12.21 REPORT:** (SINGLE PHASE LIVE FRONT PADMOUNTED TRANSFORMER)
Chairman - A. Ghafourian

Published in 1980, this document is scheduled to be republished in 1992. The working group met on Tuesday. Draft 10 was reviewed at the meeting and a Draft 11 will be produced for further review prior to the next meeting. The balloting is anticipated to begin this year, with timing set to insure 1992 publication.

3. **C57.12.22 REPORT:** (THREE PHASE LIVE FRONT PADMOUNT TRANSFORMER)
Chairman - K Hanus

Published in 1988, this document is scheduled to be republished in 1993. The working group met on Monday. The ballot for this standard has been approved at the working group level with all negatives resolved. Balloting at the subcommittee level will begin soon. The major changes discussed at this meeting involved

the tap voltages. The potential of this document being combined with C57.12.26 was reviewed.

4. **C57.12.23 REPORT:** (SINGLE PHASE SUBMERSIBLE TRANSFORMERS) Chairman - G. Piava

This standard's working group did not meet as the standard is due for publishing this year.

5. **C57.12.25 REPORT:** (SINGLE PHASE DEAD FRONT PADMOUNTED TRANSFORMERS) Chairman - N. Mohesky, report given by John Lazar

This standard carries a 1990 date. The working group met on Monday. The scheduled republishing date is 1995. Faceplate dimensions were the main topic of discussion at the meeting. With the resolvement of many issues, a Draft I will be issued for review at the fall, 1992 meeting in Cleveland.

6. **C57.12.26 REPORT:** (THREE PHASE DEAD FRONT PADMOUNTED TRANSFORMERS) Chairman - G. Paiva

This standard was last published in 1987 and is due for republishing in 1992. A very brief updating meeting was held on Tuesday by the working group. The proposed standard was balloted in the main committee with all four negative ballots resolved. It is due to go to the Board of Standards in June.

7. **C57.12.27 REPORT:** (THREE PHASE PADMOUNT UNIT SUBSTATION TRANSFORMERS) Chairman - D. Lyon

This standard is in the process of being withdrawn due to lack of utilization by the user community. The balloting to gain approval was withdrawn based on IEEE procedures that call for only a letter to IEEE illustrating that NEMA/IEEE are in agreement with the withdrawal.

8. **BAR CODING REPORT:**
Chairman - R. Jordan

A very well attended, second working group meeting was held on Monday. An excellent, technical presentation was presented to the group. The first draft of the upcoming publication was reviewed by the working group. ACTION ITEM: Manufacturers of transformers were asked to review the Draft I testing procedures on label life expectancy.

Some of the meeting topics revolved around space limitation concerns for the label, the generic capabilities of the label, life expectancy, and readability.

9. **C57 CABINET INTEGRITY WORKING GROUP**
Chairman - F. Stevens

Report was given by Tom Diamantis of Niagara Mohawk based on the most recent meeting in Washington, DC. The next meeting will be in Buffalo in June. There are four standards under the direction of this working group. C57.12.28 was published in 1988 which was the original document. C57.12.29 that covers coastal and other

work is on C57.12.30 which is the upcoming standard on submersible units.

NOTE: This committee is in need of user participation. The current list of attendees is made up of paint manufacturers, transformer manufacturers, a few utility members, but no switchgear representatives.

Secretarial problems still continue as no NEMA secretary has attended the last four meetings.

C57.12.31 on overhead equipment is due to go forward for balloting based on NEMA/EEI legal staff agreements

NEW BUSINESS

1. **DISCUSSION OF COMBINING STANDARDS:** A good discussion was given on combining four padmounted transformer standards into two standards. The proposal is to pursue a C57.12.21 and C57.12.25 combo of single-phase, live-front and dead-front units, and a combo of C57.12.22 and C57.12.26, three-phase, live-front and dead-front units. Members are enthusiastic about the idea with all four working groups in agreement.

   Question as to how to proceed will be addressed. C57.12.22 and C57.12.26 are so far along that they will go ahead for individual republishing, as well as C57.12.21, C57.12.25 may be part of the first effort.

   A chairman and Co-chairman approach may be best for this arrangement.

2. On the unfortunate side of the meeting, it was announced that both Frank Stevens and Gerry Paiva were going to have to resign from the committee due to job changes that both have recently experienced back at their utilities. Their leadership and expertise will be sorely missed by the committee.

3. Jerry Thompson was approved by the committee as its next chairman.

4. **ELECTRONIC TEST REPORTS:** J. D. Borst said that if enough interest is shown in standardization, we could proceed to develop a standard in this important area. Dave Lyon agreed to poll the user committee to gauge support for the formation of a working group to address this.

   ACTION ITEM: The user community is asked to write Dave Lyon with your input on this subject's needs.

   Dave's Address: Wisconsin Electric Power Company
   333 W. Everett Street - A543
   Milwaukee, WI 53201

The meeting was adjourned by acting Chairman Gerry Paiva at 3:45 pm.

Minutes respectfully submitted by Jerry C. Thompson.

MEETING MINUTES

DIELECTRICS TEST SUBCOMMITTEE
March 31, 1992
Birmingham, Alabama

The Dielectric Test Subcommittee met at 10:50 P.M. with 42 members and 51 guests present. The minutes of the November 5, 1991 meeting were accepted as submitted.

CHAIRMEN'S COMMENTS

Various items from the ADCOM meeting were reviewed including the new PAR form and the resolution of negative ballots. The new PAR form must be used, and the life of PAR is four [4] years. Documentation must now be furnished verifying resolution of negative ballots.

WORKING GROUP REPORTS

I. WORKING GROUP ON REVISION OF DIELECTRIC TESTS

J. B. Templeton, Chairman
R. E. Minkwitz, Sr. Secretary

The Working Group met on March 30, 1992 at 4;10 P. M. with 29 members and 27 guests present. The minutes of the November 4, 1991 meeting were reviewed, and it was found that L. B. Wagenaar's report on insulation co-ordination had been deleted. This document will be attached to the minutes. The Task Force reports were as follows;

Task Force On Revision Of Impulse Test Guide

R. E. Minkwitz, Chairman

The Task Force met on March 30, 1992 at 9;30 A. M. with 24 members and 22 guests present. The minutes of the Baltimore meeting were approved as submitted.

A. Review of Draft 5, Switching Impulse Test Guide

Draft 5 had been prepared and balloted in the Working Group and Dielectric Test Subcommittee. The result of the balloting was as follows:

Approved	-	95
Approved with comments	-	0
Total	-	95
Not Approved	-	1
Not Voting	-	11
Number returned	-	107
No Response	-	23
Total	-	142

This was a successful ballot with 82.4% response.

Several editorial changes were approved and the one "not approved" vote was discussed. The action is to discuss it again with the individual submitting the negative vote. If a resolution is not reached, the document will go forward with an explanation of the negative vote.

B. Review of Draft 2, Impulse Test Guide Forward and Table of Contents

This was a successful ballot with a 77.8% response. One negative vote was resolved.

C. Review of Digital Transient Recording

The response to this ballot was 76.2%. All comments were resolved.

D. Review of Impulse Testing Techniques

The response was barely acceptable with 75.4% return of the ballots.

It was agreed that the description of impulse testing of neutral terminals and the impulse testing of terminals brought out from buried windings would be included in C57.12.90 instead of the Impulse Test Guide. All other comments and negative votes were resolved

The proposed section 1.5 described various methods of impulse testing low impedance windings. In the Task Force meeting it was agreed to make this section rather brief, however, the Working Group reversed that decision in favor of more detailed descriptions of the four proposed methods.

In new business, B. Poulin reported on a meeting held on March 29, 1992 concerning the response of voltage dividers. A ballot will be issued prior to the Cleveland meeting concerning a method to determine divider response and definition of a value for the minimum response time for dividers

Task Force On Enhancement Voltage Time
During Power Transformer Induced Tests

M. Altman, Chairman

The Task Force met at 8:00 A. M. on March 30, 1992. The minutes of the Baltimore meeting were accepted as submitted with one correction from 15000 cycles to 1500 cycles.

L. Wagenaar presented data from induced tests for several units. M. Altman had reviewed data for about 200 induced tests also. Most of L. Wagenaar's data dealt with enhancements of 5 seconds versus 7200 cycles for M. Altman's data.

The Task Force discussed the fact that a consensus was not forth coming on reducing the time of the enhancement from 7200 cycles to 1500 cycles. Since the enhancement was only one portion of the total induced test, it was suggested that a different approach for defining the induced test should be developed. Therefore, the Task Force voted in favor to disband and recommended another task force be formed to study the comprehensive issues of the induced test, the enhancement time, when to take base readings, the criteria for acceptable apparent charge, the definition of rising trend, etc.

The Administrative Subcommittee, the Working Group, and the Dielectric Test Subcommittee subsequently approved this recommendation. A task force chairman will be sought between now and the Cleveland meeting.

NEW BUSINESS

The issue was raised that the FOW impulse levels were deleted in Table 5 of C57.12.00-1987. The FOW levels still existed in Table 4 for Class I transformers and it was suggested that the FOW values be placed in Table 5 again for Class II transformers. After some discussion, a motion was made to leave Table 5 as is. The motion carried 12 affirmative and 3 against.

The meeting was adjourned at 5:03 P. M.

II. WORKING GROUP ON REVISION OF DIELECTRIC TESTS
FOR DISTRIBUTION TRANSFORMERS

J. R. Rossetti, Chairman

The Working Group met at 1:00 P. M. on March 30, 1992 with 12 members and 17 guests present. The minutes of the previous meeting were approved as submitted.

A brief history of the Routine Impulse Test and the Routine Impulse Test Guide that is being written to address the methodology for routine impulse testing was presented.

The Task Force reports were as follows:

C57.12 C106 ROUTINE IMPULSE TESTS FOR DISTRIBUTION TRANSFORMERS

John Rossetti reported on the status of Routine Impulse Test for Distribution Transformers. This document has been balloted and approved at the Working Group, Dielectric Test Subcommittee, and Transformers Committee levels. It will now be included in the current revision of C57. 12. 90.

ROUTINE IMPULSE TEST GUIDE FOR DISTRIBUTION TRANSFORMERS

D. E. Ballard, Chairman

Don Ballard reported on the Task Force work in detection of one turn faults is small KVA, high voltage [19920/ 34500Y] distribution transformers. The small KVA, high voltage transformer is thought to be one of the more difficult in which to detect a single turn fault. Winding faults in core form transformers located at an end turn on the first layer are also thought to be difficult to detect due to the fault location.

The Task Force investigation showed that capacitive shunts could detect a worse case single turn fault by visual comparison. Also, by not routing the tank and low-voltage winding currents through the current shunt, the fault detection information would not be diluted.

Further tests are planned on larger [500 KVA] three phase transformer.

The Task Force plans to publish the first draft of the Routine Impulse Test guide as a technical paper to give the industry an opportunity to review the document and make appropriate comments.

LOW SIDE SURGES IN DISTRIBUTION TRANSFORMERS

Bruce Uhl, Chairman

Bruce Uhl gave a brief history of the work on Low Side Surges and the paper on Low Side Surges that was presented at the IEEE T & D Conference in Dallas. The Task Force found that there were not many users that kept good records or even dismantled failed transformers. Some attendees at the conference were not sure whether low side surges were responsible for any of their distribution transformer failures.

From work conducted on this subject, the Task Force recommended the following actions:

1. Write a guide which would include information from the paper and John Sklintas' presentation on low side surges in pad mounted URD transformers.

2. Include the findings of the Task Force in a guide for distribution transformers.

3. Dissolve this Task Force

The Working Group then voted that the paper on low side surges be included in a more general guide on distribution transformer protection

The meeting was adjourned at 2:25 P. M. .

III. WORKING GROUP ON PARTIAL DISCHARGE FOR TRANSFORMERS

G. H. Vaillancourt, Chairman

The Working Group met at 8:00 A. M. on March 31, 1992 with 22 members and 24 guests present. The minutes of the Baltimore meeting were approved as written.

The Task Force reports were as follows;

TASK FORCE ON ACOUSTIC DETECTION OF PARTIAL DISCHARGE IN TRANSFORMERS

E. Howells, Chairman

Mr. Howells reported that the first draft of the " Trial Use Guide for the Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers " has been prepared as Draft # 1. Following discussion at the Task Force meeting, corrections will be made to the draft. It will be balloted in the Working Group as Draft # 2. The document will be changed so that it covers all liquid filled transformers. The scope of the PAR must be modified, and the title will be changed accordingly.

The chairman invited the membership to supply him with data on the speed of sound in liquid dielectrics other than ordinary transformer oil.

Following the Task Force meeting, chairman announced that C57.113 " Guide for Partial Discharge Measurements in Liquid Filled Power Transformers and Shunt Reactors " has now been approved as a full use guide by the Standard Board. It is now waiting for ANSI approval and publication, and it will be effective for five years following publication.

The chairman reviewed the reason for cancellation of the proposed new task force for partial discharge acceptance criteria. It was believed that acceptance criteria should be incorporated into the Working Group for Revision of Dielectric Tests, and it was recommended that this Working Group be asked to accept this task.

The Dielectric Tests Subcommittee and the Administrative Subcommittee subsequently accepted this recommendation so that the Working Group on Revision of Dielectric Tests will be responsible for partial discharge acceptance limits.

Since the tasks on partial discharge electrical measurement has been completed, it was decided that the Working Group would remain active and concentrate on acoustic detection and location of partial discharges. The work on acoustic methods previously performed at the task force level will now be accomplished at the working group level.

The chairman of the Working Group announced that he was resigning the chairmanship to accept the position of Chairman, Standards Subcommittee. The Dielectric Tests Subcommittee and the Administration Subcommittee later approved Mr. Ed Howells as the new chairman of the Working Group. The appointment is effective immediately.

OTHER BUSINESS

Loren Wagenaar reported on the efforts of the group organized to consider insulation co-ordination when metal oxide arresters are used. It does not appear that there are any problems involved with the application of metal oxide arresters. However, some persons still have some concerns, and it is recommended that a Task Force be established to consider all aspects of this situation.

The Dielectric Tests Subcommittee and the Administrative Subcommittee approved establishing the Task Force on Transformer Insulation Co-ordination with Metal Oxide Arresters. Mr. R. Degenaff was approved as chairman of the Task Force. A PAR will be prepared, and Task Force members will be obtained for this work.

NEW BUSINESS

The chairman reported that there had been some discussion on the formation of a Working Group to consider partial discharge measurement in service. This matter will be considered at the Cleveland meeting.

The meeting was adjourned at 11:55 A. M.

Harold Moore, Chairman

J. B. Templeton, Secretary

DIELECTRIC TESTS SUBCOMMITTEE MEETING ATTENDANCE

DATE 3/31/92

MEMBERS	PRESENT	ABSENT
E. J. Adolphson	X	
D. J. Allen		X
R. Allustriarti		X
M. S. Altman		X
R. J. Alton		X
S. W. Arnold		X
D. E. Ballard	X	
D. A. Barnard	X	
A. Bartek	X	
P. L. Bellaschi		X
J. J. Bergeron		X
J. V. Bonucchi	X	
C. V. Brown		X
W. J. Carter	X	
C. R. Chatterji		X
J. L. Cochran		X
J. C. Crouse	X	
D. H. Douglas		X
D. A. Duckett		X
D. J. Fallon	X	
H. G. Fischer	X	
J. A. Fleeman		X
M. Frydman		X
R. Garcia	X	
W. R. Henning	X	
John Holland		X
P. J. Hopkinson		X
E. Howells	X	
Y. P. Iijima	X	
W. N. Kennedy	X	
R. E. Lee		X
F. A. Lewis	X	
H. Light	X	
L. Lowdremilk		X
D. L. Lowe	X	
R. Lowe	X	
T. Massoude		X
J. W. Matthews	X	
J. T. McAlpin		X
F. J. McCann		X
G. G. McGree		X
C. J. McMillen	X	
S. P. Mehta		X
C. K. Miller	X	
R. E. Minkwitz, Sr	X	
H. R. Moore	X	
H. P. Moser		X
R. J. Musil		X
S. K. Oklu		X
S. H. Osborn	X	

B. K. Patel		X
D. D. Perco		X
M. D. Perkins		X
D. W. Platts	X	
J. L. Puri	X	
C. A. Robbins	X	
J. R. Rossetti	X	
P. Russman	X	
V. S. N. Sankar	X	
M. P. Sampat	X	
W. E. Saxon	X	
D. M. Shah		X
D. N. Sharma	X	
V. Shenoy		X
H. J. Sim	X	
L. R. Smith		X
S. D. Smith		X
W. W. Stein	X	
L. R. Stensland		X
J. B. Templeton	X	
T. P. Traub	X	
G. H. Vaillancourt	X	
R. A. Veitch	X	
L. B. Wagenaar	X	
B. H. Ward	X	
R. J. Whearty	X	
G. R. Wollerton		X

ATTENDING AND REQUESTING MEMBERSHIP

R. Barker
T. Bode
D. Chu
B. Forsyth
J. McGill
R. W. Thompson
S. C. Tuli
J. Watson

GUESTS

W. Boettger
J. Brown
M. Christini
T. F. Clark
A. Delgado
J. Foldi
G. Forrest
E. T. DeFur
F. E. Elliott
P. Feghali
D. Gerlach
D. F. Goodwin
C. C. Hancock
J. W. Harley
G. Henry
C. P. Kappeler
L. A. Kirchner
G. K. Krause
B. Kumar
M. Lau
S. R. Lindgren
J. Long
J. Melanson
G. Michel
W. J. McNutt
C. R. Murray
L. Nicholas
R. Nordman
E. Norton
D. E. Orten
D. E. Parr
D. Patel
B. Poulin
P. Riffon
S. Shah
E. Smith
J. Sullivan
J. Tuohi
R. D. Wakeam
F. Willett
G. Sparagowski
L. A. Swenson
E. R. Trummer
A. L. Wilks
J. Wood

BUSHING SUBCOMMITTEE
Report to the Transformers Committee
April 1, 1992

The Bushing Subcommittee met on Tuesday, March 31, 1992 with 15 members and 16 guests present. Prior to the meeting, Robert Thompson of PSI Energy requested membership. Since the last meeting, there has been one resignation from the committee so membership remains at 34.

The minutes of the November 5, 1991 meeting were approved as written. Chairman Wagenaar reported that an IEEE Standards Office editor was preparing to publish both C57.19.00, General Requirements and Test Procedures for Outdoor Apparatus Bushings, and C57.19.01, Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings.

The Subcommittee then heard reports from its three working groups:

Working Group on Revision of C57.19.01

Chairman Prit Singh reported that the working group met on Monday with 10 members and five guests present. The working group worked on two tables. The following changes were agreed upon for Table 2, Electrical Insulation Characteristics for EHV Outdoor Apparatus Bushings:

1) Nominal system voltage would be used in place of maximum system voltage, just as is done in Table 5 of C57.12.00. These voltages are 345, 500 and 765 kV instead of 362, 550 and 800 kV used in the present standard.

2) Only one BIL will be shown for each nominal system voltage. These BILs are:

Nominal System Voltage	BIL
345 kV	1175 kV
500 kV	1675 kV
765 kV	2050 kV

These BIL ratings are all the highest that appear in Table 5 of C57.12.00 for their respective nominal system voltages. Test requirements presently appear in C57.19.01 for the 1175 kV and 1675 kV BIL bushings, but do not for the 2050 kV BIL bushings.

These requirements will be:

- Maximum line-to-ground voltage	485 kV
- Minimum creep	485 inches
- 60 Hz, 1-Minutes, Dry Withstand Test	920 kV
- Full Wave Impulse	2050 kV
- Chopped Wave Impulse	2360 kV
- Wet Switching Impulse	1450 kV

Chairman Singh also presented a new version of Table 8, Cantilever Design Test Requirements, for consideration of the members. The revised table is somewhat simpler than the old table since it consolidates several bushing ratings. It also extends the table by specifying cantilever requirements for bushings rated through 765 kV.

The working group also started to review a proposal to have standard ratings to cover the 25 kV through 230 kV range. Discussion was not completed because of lack of time.

Working Group on Bushings for DC Application (PC57.19.03)

Chairman Olaf Heyman reported that nine members and six guests attended the meeting which was held on Monday (3/30). Several aspects of the new document were reviewed. Since there is a lack of experience regarding the test procedure for contamination testing, and also due to the special nature of contamination testing, it was decided to specify these tests as a special test rather than a design test. An attempt will be made to establish the ESDD (Equivalent Salt Deposit Density) to be used in the contamination tests before the next meeting.

Prit Singh submitted a table for cantilever test requirements as a function of BIL and current rating. The cantilever test requirements are, in general, lower than corresponding AC bushings because DC bushings tend to be longer, and it is therefore more difficult to obtain cantilever strength for them.

In order to be consistent with the present draft of C57.129 for DC converter transformers, it was agreed to use the same acceptance criteria for the peak partial discharge levels during the dc tests. However, the maximum permitted number of peaks for the bushing will be limited to half of the number permitted for converter transformers.

It was also agreed that lightning and switching ratings and tests would be agreed upon by Purchaser and Manufacturer rather than having standard BIL and switching impulse (SIL) ratings for each dc system voltage. There are basically two reasons for doing this. First, there is still significant variation between BIL and SIL ratings of different systems of the same dc system voltage. Second, significant cost is added to the valve hall if oversized wall bushings are used.

It was also agreed that dry switching impulse and lightning impulse tests will be routine tests and that the wet switching impulse test will be a design test.

Working Group on Bushing Application Guide (C57.19.100)

Chairman Fred Elliott reported that the working group met on Monday (3/30) with 10 members and 11 guests present. It was announced that the proposed upgrade of C57.19.101, Bushing Loading Guide, to a full guide will be considered by the IEEE Standards Board at their June 18, 1992 meeting.

It was also reported that Draft 7 of C57.19.100, Bushing Application Guide, was ballotted within the Bushing Subcommittee. It received two negative ballots and several comments of substantive and editorial nature. The negative ballots and most of the substantive comments were addressed in the meeting and Draft 8 will be ballotted in the Bushing Subcommittee before the next meeting.

Additional Bushing Subcommittee Discussion

Prit Singh reported that he had received, as Technical Advisor to IEC/SC36A, a report from the IEC/SC36A Secretary to comment on whether IEC should form a working group to write a standard giving guidelines for the interpretation of dissolved gas analysis of oil-impregnated bushings. Prit intends to vote in favor of forming such a group, but will comment that dissolved gas analysis should be performed on bushings only for diagnostic purposes.

L.B. Wagenaar
Chairman

IEEE PES TRANSFORMERS COMMITTEE

AUDIBLE SOUND AND VIBRATION SUBCOMMITTEE

BIRMINGHAM, ALABAMA

MARCH 31, 1992

Minutes

Chairman Allan Teplitzky opened the meeting at 2:00 p.m. with 11 members and 25 guests present. Four guests requested membership in the subcommittee for a total membership of 19.

New Members: Allan Bartek, Cooper Power Systems
John Crouse, General Electric
Barin Kumar, SMUD
Shashi Patel, Georgia Power

Minutes of the November 5, 1991 meeting in Baltimore were approved.

Draft 13, of the proposed revision of the audible sound measurement portion of C57.12.90, is in the process of being submitted to the Standards Board. Coordination is in the process of being completed with submittal planned by May 8, 1992.

A transformer siting guide for transformer sound is in the initial research and source review stage. A task force formed at the Baltimore meeting is reviewing the ESEERCO study. The review should be complete in early May. The results of the review will be sent to the subcommittee within two additional months, and additional progress on this and other sources will be presented at the fall meeting in Cleveland.

The former NEMA TR1 transformer maximum sound level tables are under study. Various alternatives including inclusion of the NEMA TR1 in C57-.12.00, modification and/or addition to the table, use of the German VDE curves for transformer sound power level, and development of a complete new table were discussed. The task force addressing this issue will initiate a survey of manufacturers to determine feasibility of the above alternatives.

The meeting adjourned at 4:15 p.m.

Sincerely,

Lennart A. Swenson
Secretary, Audible Sound &
Vibration Subcommittee

EPRI
Electric Power
Research Institute — *Leadership in Science and Technology*

April 15, 1992

TO: Mr. Wallace B. Binder, Jr.
Secretary, IEEE Transformers Committee
Transmission & Distribution Engrg. Dept.
Ohio Edison
76 South Main Street
Akron, Ohio 44308

FROM: Stan Lindgren, Project Manager

SUBJECT: **EPRI LIAISON REPORT**

The following report is for inclusion in your minutes for the April 1, 1992 meeting.

1. EHV Converter Transformer:

   - Test results confirmed 25% or greater major insulation size reduction can be attained with some further work.
   - Final report will be published pending patent filing.

2. Amorphous Steel For Power Transformers:

   - A pilot facility automated cutting line has been built and tested.
   - 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. However, the first core using consolidated material had higher losses than expected. Work is in progress to understand why this is the case and to find solutions.

3. Advanced Power Transformer:

   - Reduced load loss feasibility has been demonstrated.
   - Detailed analytical studies exploring individual design aspects has been completed.
   - As a part of Phase II a 47 MVA three phase core form prototype was built and successfully short circuit tested March, 1991 delivered to HL&P and is now in service.
   - Two 80 MVA 115 kV delta to 161 kV wye, three phase units are being built for one end of ESEERCO's six-phase demonstration project. Although 2 winding, the units are comparable to autotransformers. A dielectric problem, believed to be due to the very unique design for the six phase application, is under investigation but is not expected to affect the technology. One unit was successfully short circuit tested February, 1992.
   - Development of shell form conductor and physical models continues.

4. Static Electrification in Power Transformers:

- This is the suspected failure mechanism in over 22 core form and shell form FOA transformers worldwide. Recent failures involve 20 to 25 year old transformers that had been recently reprocessed after oil was removed for maintenance.

- Current work is focussed on the effects of temperature and moisture transients. Tests on representative transformer cooling components have been completed. A project is underway to monitor a large FOA transformer in the field. The instrumentation systems have been tested and are ready for a prototype installation. A 3rd Workshop was held January 92 in San Jose, California.

5. Bubble Evolution in Overloaded Transformers:

- Very rapid load changes can cause bubble formulation under some conditions and reduce 60 Hz and impulse dielectric strength. This has been demonstrated in models with rapid/high O.L.

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

- A final report (EL7291) covering more complete test data will be published soon. A computer program covering bubble evolution plus the ANSI Loading Guide formulas is being developed as an EPRIGEM.

6. Active Transformer Noise Cancellation System:

- Only noise reduction in one direction has been pursued.

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

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

- A field demonstration is underway.

7. High Voltage Instrument Transformers

EPRI sponsored a workshop 9/90 to provide a forum to compare and categorize failure information, failure modes and potential mitigation measures. This was an outgrowth of the roundtable in Washington DC 4/88. Proceedings, TR 100205, are in process of being published. A project has been initiated to study switching transient effects on HVCT's.

8. Power Transformer Tank Rupture - Risk Assessment and Mitigation

This project started early 1991. Over 20 well documented cases have been collected from which several will be selected for detailed study.

9. Geomagnetic Induced Currents (GIC)

EPRI has three projects underway and one in RFP evaluation stage.

- A feasibility demonstration is in process for detection of transformer core saturation at fifteen locations and reporting to a central location. Useful data was collected from several GIC events. The system is being expanded to 19 locations.
- Two transformer neutral GIC blocking devices were installed in 1991 and preliminary field trials were performed with good results in June, 1991.
- A project to evaluate the response of protective relaying systems to GIC has just been initiated.
- The last project involves work to better understand GIC events.

10. Thermal Models for Real-Time Monitoring

This new project is getting underway involving all transmission components including power transformers.

SRL:sf:9862.M

cc: Stig Nilsson
John Borst

LAISON REPORT
P. A. PAYNE

FOR IEEE/PES TRANSFORMER COMMITTEE
BIRMINGHAM, ALABAMA
MARCH 27 - APRIL 1, 1992

STANDARDS COORDINATING COMMITTEE NO. 4 MEETING
IEEE/PES WINTER POWER MEETING
IEEE HEADQUARTERS NEW YORK, N.Y.
JANUARY 27, 1992

I. Standards Coordinating Committee No. 4 - Insulation: SCC4

Results of balloting for reaffirmation of IEEE Standards No. 1, 96, 98, 99 and 943 were reported to be affirmative. The request will be made to the IEEE Standards board for reaffirmation of the aforementioned Standards.

Consideration is being given to include Class E (systems) and Class 120 (materials) in the next revision of IEEE-1 for harmonization of IEEE and International Standards. As other insulation classes are increasingly appearing in National Standards, it was agreed that these classes should be included in the relevant IEEE Standards. As IEEE No. 1, 98 and 99 are inter-related, the revisions will be concurrent and will include addition of the relevant insulation classes. Ad Hoc committees were established for the revisions.

The Committee is considering the possibility of a SCC4 meeting in conjunction with other Committees to facilitate participation of other interested parties. There is interest for a SCC4 meeting during a future Transformer Committee Meeting.

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

A replacement for the chairman of TC-63 has been requested as the current chair's term expires this year. The United States is willing to continue Chairmanship and has endorsed Canada for acceptance of Secretariat.

A report was given on the Working Group 6 meeting in Trondein, Norway during August 1991. Six documents of publication IEC 505 were approved and will be reviewed by the Editing Committee at the upcoming meeting in Lyngby, Demark in June, 1992. The revision of IEC 505 will be the main activity of TC-63 in Lyngby.