MINUTES OF THE
IEEE TRANSFORMERS COMMITTEE MEETING
APRIL 10-13, 1988
WASHINGTON, D.C.

IEEE TRANSFORMER COMMITTEE
MEETING
APRIL 10-13, 1988
WASHINGTON, D.C.

MEMBERS OR REPRESENTATIVES PRESENT (71)

1. R. Allustiarti
2. J. C. Arnold
3. D. A. Barnard
4. W. B. Binder
5. J. V. Bonucchi
6. C. V. Brown
7. D. J. Cash
8. O. R. Compton
9. F. W. Cook, Sr.
10. J. Corkran
11. D. W. Crofts
12. D. H. Douglas
13. J. C. Dutton
14. J. A. Ebert
15. R. L. Ensign
16 D. J. Fallon
17. H. G. Fischer
18. D. W. Gerlach
19. R. L. Grubb
20. G. Gunnels, Jr.
21. G. Hall (rep.)
22. J. H. Harlow
23. F. W. Heinrichs
24. W. Henning
25. K. R. Highton
26. P. J. Hoefler
27. C. R. Hoesel
28. R. H. Hollister
29. C. C. Honey
30. F. Huber, Jr.
31. A. M. Iversen
32. A. J. Jonnatti
33. C. P. Kappeler
34. W. N. Kennedy
35. E. Koenig
36. J. G. Lackey
37. R. E. Lee
38. L. A. Loudermilk
39. M. L. Manning
40. T. Massouda
41. J. W. Matthews
42. S. P. Mehta
43. C. K. Miller
44. R. E. Minkwitz, Sr.
45. M. I. Mitelman
46. H. R. Moore
47. R. J. Musil
48. W. H. Mutschler, Jr.
49. J. W. McGill
50. C. J. McMillen
51. E. T. Norton
52. B. K. Patel
53. H. A. Pearce
54. D. Perco
55. J. M. Pollitt
56. C. T. Raymond
57. W. E. Saxon
58. V. Shenoy (rep.)
59. W. W. Stein
60. D. W. Sundin
61. A. L. Tanton
62. V. Thenappan
63. T. P. Traub
64. R. E. Uptegraff, Jr.
65. G. Vaillancourt
66. R. A. Veitch
67. L. B. Wagenaar
68. W. E. Wrenn
69. A. C. Wurdack
70. D. A. Yannucci
71. E. J. Yasuda (rep.)

IEEE TRANSFORMER COMMITTEE
MEETING
APRIL 10-13, 1988
WASHINGTON, D.C.

MEMBERS ABSENT (48)

1. L. C. Aicher
2. D. J. Allan
3. B. F. Allen
4. S. J. Antalis
5. E. H. Arjeski
6. J. Aubin
7. P. L. Bellaschi
8. S. Bennon
9. J. J. Bergeron
10. J. D. Borst
11. G. H. Bowers
12. J. K. Easley
13. C. G. Evans
14. P. P. Falkowski
15. S. L. Foster
16. M. Frydman
17. H. E. Gabel, Jr.
18. D. A. Gillies
19. F. J. Gryszkiewcz
20. C. Hurty
21. G. W. Iliff
22. R. G. Jacobsen
23. D. L. Johnson
24. D. C. Johnson
25. J. J. Kelly
26. E. J. Kelly
27. A. D. Kline
28. H. F. Light
29. T. G. Lipscomb, II
30. L. W. Long
31. R. I. Lowe
32. H. B. Margolis
33. C. Millian
34. W. E. Morehart
35. W. J. McNutt
36. R. A. Olsson
37. T. Orbeck
38. C. A. Robbins
39. L. J. Savio
40. L. R. Stensland
41. E. G. Strangas
42. L. Swenson
43. R. C. Thomas
44. J. A. Thompson
45. D. E. Truax
46. F. Vogel
47. R. J. Whearty
48. A. Wilks

IEEE TRANSFORMER COMMITTEE
MEETING
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GUESTS

1. J. L. Akers
2. M. S. Altman
3. B. L. Beaster
4. A. Bartek
5. R. Bancroft
6. D. Basel
7. W. J. Carter
8. P. Darveau
9. F. Elliott
10. J. Fleeman
11. K. Fleming
12. M. Frankchek
13. J. M. Frank
14. R. H. Frazier
15. R. Garcia
16. R. E. Gerhart
17. R. L. Grunert
18. P. J. Hopkinson
19. J. W. Hupp
20. O. W. Iwanusiw
21. S. P. Kennedy
22. G. A. Klein
23. G. Krause
24. G. C. Laguens
25. R. L. Lane
26. A. K. Larson
27. F. A. Lewis
28. S. Lindgren
29. G. McCrae
30. M. M. McGee
31. L. D. Miller
32. C. L. Moore
33. S. P. Moore
34. C. Murray
35. L. Nicholas
36. S. K. Oklu
37. P. A. Payne
38. D. W. Platts
39. G. Pregent
40. L. W. Pierce
41. J. Rossetti
42. J. Schneider
43. D. N. Sharma
44. D. Takach
45. M. Thaden
46. J. A. Tingen
47. W. B. Uhl
48. F. E. Willett
49. H. J. Windisch
50. F. N. Young
51. G. C. Zguris

IEEE TRANSFORMERS COMMITTEE
MEETING MINUTES
APRIL 10-13, 1988

Past Chairman Charlie Honey opened the meeting by presenting a eulogy for Fred Vogel long standing member of the Committee, a two time Chairman, a pioneer of modern transformer dielectric design and testing technology who died in March, 1988. He has been credited with being the father of impulse, switching surge, and partial discharge testing.

Chairman Olin Compton noted the absence of Secretary John Bergeron due to a sudden, extreme financial problem at his Company. Mr. Compton expected Mr. Bergeron's attendance at the Long Beach, Fall Meeting.

The attendance at this meeting included 71 members, and 51 guests as recorded on the preceeding attendance listings.

The minutes of the November 4, 1987 New Orleans Meeting were approved with the following correction: Dr. Stein is to be added to the list of members present.

Report of Subcommittees:

Administrative Subcommittee:

Chairman Olin Compton announced the election to membership to the Main Committee of the following individuals:

| | |
|---|---|
| Dennis Gerlach | Salt River Project |
| John Davis | Sangamo-Western |
| Charles T. Raymond | General Electric |
| David A. Barnard | Achme Electric |

Mr. Compton discussed the educational aspects of participation in the Transformers Committee and the benefit to newer members of being able to associate with people who are real experts in this field and provide knowledge and education not available anywhere else. He urged the newer members to become actively involved in the Working Groups as a means of opening the door to this knowledge.

Mr. Compton reported on a discussion at the Administrative Subcommittee of the heavy Working Group Schedule on Monday wherein up to seven concurrent meetings are held. This gives the host scheduling problems as well as makes it difficult for a person to attend all meeting of interest. It also makes it difficult to get knowledgeable people at a given meeting because of parallel commitments. Possible solutions such as extending the meeting time, including a four day meeting, meeting on Sunday, meeting on Wednesday all day, are all under consideration. He asked for the advice and counsel of anyone who has feelings on this subject. Thoughts on how should we run the meeting, will it affect your Company situation, would it affect your attendance would be appreciated.

Mr. Compton then discussed the conflict of our Spring meeting with the 1989 Transmission and Distribution Conference. We are actively attempting to see what options are available to us regarding hotel rooms in Chicago. A straw poll of those affected was taken and appreciable impact was indicated. It is intended to work out this problem.

See Attachment (ATTACH. ADCOM 4/88) for minutes of Administrative Subcommittee Meeting and Chairman Compton's report to the Transformers Committee.

Future meetings of the Transformers Committee will be:

| | |
|---|---|
| Long Beach, California | November 6-9, 1988* |
| Chicago, Illinois | April 9-12, 1989 |
| Charlotte, N.C. | Fall 1989 |
| Denver, Colorado | March 25-28, 1990 |
| Montreal, Canada | October 21-24, 1990 |

*Recently Rescheduled to October 31 - November 2, 1988

West Coast Subcommittee - Dennis Gerlach

West Coast Subcommittee last met on February 18, 1988 in San Diego. All four Working Groups met at that time.

The Loss Evaluation Guide was being balloted at that time in the Main Committee. Of 55 returned ballots only one negative, hopefully resolvable, vote was received. As of yesterday, the required 75% return has been received with only the single negative ballot.

The Seismic Guide for Power Transformers and Reactors is ready for a Main Committee Ballot. The Working Group Chairman asked that members please be prompt in their return of ballots even though the interest in this subject is higher in certain areas of the country.

The Guide for Installation of Liquid Immersed Power Transformers is currently being pursued.

The Fire Prevention and Protection Guide for Liquid Filled Power Transformers has received a PAR and coordination has been requested by the Nuclear Power Engineering Committee and the Substation Committee.

It was also noted that a general discussion of some transformer and reactor failures was also held at the February meeting.

See Attachment (ATTACH. 4/88-A) for remainder of report.

Transformer Standards - Jim Harlow

Mr. Harlow noted the definite cancellation of the IEEE Indemnification Program and the proposed IEEE Audit Program. It was noted that the IEEE Standards Manual which was supposed to be published in 1988 has been distributed. Mr. Harlow encouraged anyone who will be submitting a Standard to REVCOM in the near term to look over the Manual to avoid potential problems regarding requirements. The Standards Corner section of the Computer Applications in Power was mentioned as they are looking for 500 word articles and perhaps Committee Members may be interested in contributing such an article.

The IEEE has proposed a "Standards Funds Solicitation Program". This was discussed at the Administrative Subcommittee and Subcommittee Chairmen were requested to mention this at their meetings so as to get people aware of its existence. We will want to get an indication of how our members feel about this matter. Under the plan IEEE would solicit funds from Corporations to help fund the cost of publishing Standards. The past year deficit in this area was $1,000,000. The Standards Board voted this proposal down on the basis that we are a professional organization and don't solicit from Corporations. Concerns of Corporate influence of Standards were raised. The issue then went to the IEEE Board of Directors who approved the idea thereby overriding the Standards Board. The Standards Coordinating Committee asked that the technical committees express their attitudes on this concept. Discussion was held on this concept. A show of hands indicated about 8% feeling that the solicitation was proper, about 12% had no opinion, and about 80% were opposed to the concept.

A letter was put out by IEEE indicating that Standards would carry the date of approval instead of the date of printing. This raises problems of confusion as to which standard a product produced between standard approval and publication times must comply with. A letter was sent to the Standards Board and the Board agreed to withhold implementation of this Policy until the two year backlog is reduced to 3 months, thereby, making this a moot issue. However, a new publication just produced did carry the approval date in 1986 which contradicts this agreement. We will indicate our displeasure with the appropriate people. This also confuses the 5 year re-affirmation which still goes by the publication date, we are told.

See Attachments (ATTACH 4/88-B and C) for remainder of report.

Awards and Recognition - Dean Yannucci

Mr. Yannucci discussed several of the 11 total PES Awards including Prize Paper, for which we always consider papers reviewed by our Committee; Working Group Award for a Technical Paper, Working Group Award for a Standard or Guide, W.R.G. Baker Prize Paper Award for Authorship of an Outstanding Paper in the Transactions, a Journal, or Magazine (need not be an IEEE Member); the Donald J. Fink Prize Paper Award for a Paper related to an outstanding Survey, Review, or Tutorial Paper; the Thompson Award for the most outstanding paper for Authors under 30 years of age; the Alfred Noble Intersociety Award for a paper sponsored by AIME, ASCE, ASME, or IEEE publications.

Certificates of Appreciation were presented to:

John J. Bergeron for Chairmanship of the Working Group for Revision of Dielectric Tests

George Bryant for Chairmanship of the Working Group on Semiconductor Rectifier Transformers

The 1988 Transformers Committee Award was presented to:

L.S. McCormick for Distinguished Service to the Committee

See Attachment (ATTACH. 4/88-P) for Awards Committee Report

Performance Characteristics - J. D. Borst

See Attached Report (ATTACH. 4/88-D)

EPRI - Stan Lindgren

See Attached Report (ATTACH. 4/88-E)

Insulation Life - Dave Douglas

See Attached Report (ATTACH. 4/88-F)

Insulating Fluids - Henry Pearce

See Attached Report (ATTACH. 4/88-G)

Instrument Transformers - John Davis

Mr. Davis began by acknowledging the effort put forth by Messrs. Mike Altman and Mr. George McCrae in organizing the Round Table Meeting on "In Service Failures of Free Standing Current Transformers". The Subcommittee recommended establishment a Task Force as a forum for continued discussions on this subject.

See Attached Report (ATTACH. 4/88-H)

Dry Type Transformers - R. Uptegraff

See Attached Report (ATTACH. 4/88-I)

The area of "clarification of intent" types of questions were discussed. Many times a participant in a standards making process is asked, at a later date, what was intended by a given section. It was strongly recommended that interpretations of intent not be given by members. Mr. Compton cited the problems involved in the ASME Hydrolevel Case wherein members who gave an opinion regarding the standard were also successfully sued because their "opinion" tended to limit competition. If anyone is asked for an opinion, refer them to the Standards Board who can go down the chain to the Committee for an answer and a "non-commercial" reply can be insured via the normal process.

Dielectric Tests - R. E. Lee

See Attached Report (ATTACH. 4/88-J)

HVDC Converter Transformers and Reactors - W. N. Kennedy

The Subcommittee met on Monday with three members and eight quests present. Three general topics were discussed:

The Bushing Subcommittee has requested certain information regarding bushings for HVDC equipment. At an earlier meeting, it was decided that these bushings need additional testing and that the Bushing Subcommittee will set up a working group initially with three volunteers from the HVDC Subcommittee.

The Subcommittee overall direction was discussed. Initially it was felt that guide material was needed, however, it has become apparent that standards type documents are more necessary and so work will begin on a Draft Trial Use Standard. It is felt this will also coincide with IEC efforts.

Regarding loss calculations and measurements, at the previous meeting, Dr. Ram of Federal Pioneer presented previous work done by him and his associates. Also recently, Dr. Stein has provided information to the Subcommittee on CIGRE efforts and work done in Germany in this area. Copies of this material has been distributed to the Subcommittee as well as to the Working Group on Rectifier Transformers.

See Attachment (ATTACH. 4/88-K) for remainder of the report.

Bushings - Loren Wagenaar

The Bushing Subcommittee met on Tuesday with eleven members and four guests present.

Mr. Wagenaar reported that he received a letter from Paul Lange stating that IEEE would not publish the P757 Loading Guide since it was approved by the Standards Board in December, 1981 and is by that measure, due for revision.

The Working Group discussed several options and determined that the P757 Guide should be reaffirmed as an IEEE Trial Use Guide and this recommendation should be presented to the Transformers Committee. Therefore, this matter was put to a vote of the Main Committee and the Committee unanimously voted to reaffirm document PC 57.19.101 (P757) IEEE Trial Use Guide for Loading Power Apparatus Bushings. There were no abstentions, no negative votes and a proper quorum was present to conduct this business.

Mr. Wagenaar also indicated that he needed a Chairman for the Working Group on D.C. Bushings.

For the remainder of this report, see Attachment (ATTACH. 4/88-L)

Audible Sound and Vibration - A.M. Teplitzky

Joe Pollitt reporting for A.M. Teplitzky.

The Subcommittee met with eleven members and ten guests present.

Draft 4 had been balloted with 18 out of 24 Subcommittee Members responding. Results were 9 approved, 4 approved with comments, 3 negatives and 2 not voting. Draft 5 was prepared by Allan Teplitzky incorporating the many of comments together with a list of unresolved comments for Subcommittee discussion. These were discussed at the meeting and a new Draft 5 will be completed and balloted by the next meeting.

A new Working Group will be formed to produce a Guide for the Control of Transformer Sound, Project 523, at the next meeting.

See Attachment (ATTACH. 4/88-M) for report.

Technical Papers for Future Meetings - R. A. Veitch

At the 1988 Winter Power Meeting, there were two Transformer Sessions with a total of eight papers presented. Three of these papers were co-authored by members of the Transformers Committee. The eight papers were selected from a total of 16 submitted papers.

The 1988 Summer Power Meeting will be held in Portland, Oregon. There will be two transformer sessions. Four papers will be presented at the first session and three papers will be presented at the second. Twelve papers were submitted and from these the seven were selected. Forty eight reviews were done by thirty six reviewers during the review process for this meeting

Mr. Veitch thanked these thirty six individuals for their prompt response to this important duty of this committee. He also noted the high quality of the reviews which were done.

Regarding the selection process, Mr. Veitch discussed problems which arise when differing reviews on a paper are received. RJO reviews are taken very seriously. It was noted that an RJO review of a paper which is accepted would form the basis for a very good discussion of the paper. He offered to read any submitted discussions at the meeting when the reviewer can not be in attendance.

Mr. Veitch also discussed his role as a member of the Technical Council Ad-Hoc Technical Publications Committee which meets twice a year at the Winter and Summer Power Meetings. The following highlights were reported:

A discussion of the confidentiality of paper review was held. A statement will be added to the review form indicating that papers under review are to be considered to be confidential. No use may be made of the potential knowledge gained during the review process.

The current policy stating that a biographical sketch of the author is mandatory and the requirements of a photograph is optional was discussed and reaffirmed.

Regarding papers submitted in response to a specific call for papers it was agreed that the Authors Declaration of Intent Form would include a check off area to specify the particular subject for which the paper was prepared.

A target number of papers for presentation at the Transformers Committee Sessions at the next Winter Power Meeting was set at seven. This is a guideline based on a historical trend and may be adjusted if good quality papers were received.

A complaint raised by Mr. C. McMillan about papers accepted for the T & D Conference last year which had not yet been published in the Transactions, yet papers presented at later conferences have been published. He did not feel that papers accepted at a later date should be published ahead of others accepted earlier. The problem was discussed and Mr. Compton felt that since the page counts do not include the T&D meeting, the potential exists for considerable delay in publication of these papers. He has received assurances from the Editor that all papers from the 1986 T&D Conference will be published. Mr. Compton felt the issue was being addressed. It was also reported that Conference papers will probably be utilized at future T&D Conferences. These conference papers will not have to be published in the Transactions.

Mr. Veitch presented a new draft scope for the Main Transformers Committee. The following points of discussion were noted: the reference to insulators and hardware is inappropriate as they are not covered by IEEE Standards; the railway service transformer reference should be deleted as well as the reference to test transformers and constant current transformers. Also bushing transformers should be treated as instrument transformers. The reference to Transformers Outdoor Apparatus Bushings should be simply called Outdoor Apparatus Bushings.

The reference to Speciality transformers also should be deleted in favor of the naming of the specific types of transformers which we do address. Mr. Veitch recommended that the attached Scope (ATTACH. 4/88-O) for the Transformers Committee be adopted. A motion was presented by Mr. Veitch to adopt the discussed scope changes. The motion passed unanimously. The new scope will be in accordance with this attachment.

See Attachment (ATTACH. 4/88-N) for report.

Liaison Reports

See Attachment (ATTACH 4/88-Q) for liaison reports which were filed by our representatives.

New Business

No new business was brought up.

The meeting was adjourned by Chairman Compton.

Respectfully Submitted,

John J. Bergeron
Secretary

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Minutes of

ADMINISTERATIVE SUB COMMITTEE MEETING
7:30 PM, MONDAY APRIL 11,1988
WASHINGTON, D.C.

Attendance

Compton, O.R.
Borst, J.D.
Davis, John
Douglas, D.H.
Gerlach, Dennis
Harlow, J.H.
Kennedy, W.N.
Lee, R.E.
Pearce, H.A.
Teplisky, A.M.
Veitch, R.A.
Wagenaar,L.B.
Uptegraff, R.E.
Yannucchi, D.A.

Guests

Arnold, J. (P.T.)
Huber, F.

2. The minutes of the New Orleans Meeting were approved after some typographical correction.

4. J. Arnold reported 172 members and representatives had registered. We expect a positive cash flow. No complaints of registration or accommodations.

4a. Future Meetings were announced as follows:

November 6-9, 1988 Long Beach Ramada Renaissance -Carl Hurty, Host.
April 2-5,1989 Chicago Drake Hotel - Len Stensland, Host (This is a conflict with the IEEE/PES T&D Meeting. Date was subsequently changed to April 9-12,1989.)
Fall, 1989 Charlotte Adamhost Hotel - William Saxon, Host
March 25-28,1990 Denver Marriott-City Center - Felix Cook, Sr., Host
October 21-24, 1990 Montreal, Quebec, Canada - George Vaillancourt, Host
Spring, 1991 Phoenix suggested. More later.

6. Standards Coordination
See attached report. Agreement was reached to discuss the request for Corporate Funding of Standards work in the Committee Meeting.

7. Review of Technical Council Activities.
See attached report.

8. SubCommittee Activity Reports.
See attached reports.

9. Liaison Reports were circulated. W. Kennedy has been endorsed by the U. S. National Committee to serve on CIGRE.

10. Papers for Future Meetings.
See attached report by Bob Veitch.

11. Committee and Subcommittee Membership Review.
The following were nominated and recommended for membership on the Committee: David Barnard, Acme Electric; John Davis, Sangamo-Western; Dennis Gerlach, Salt River Project; and Charles Raymond, General Electric.

12. Awards.
Dean Yannucchi announced the following awards:
John Bergeron - Certificate of Appreciation

George Bryant - Certificate of Appreciation
L.S. McCormick - Transformer Committee Distinguished Member Award

13. Old Business.
Robert Veitch reported in his study of the Committee Scope. It was agreed that the recommended changes should be presented to the Main Committee with a recommendation for approval.

14. New Business.
Discussions were held on ways to solve the crunch of 7 concurrent meetings on Monday. It is almost impossible for many members to attend most of the meeting of their choice. In addition, this enforced absence of key members is slowing progress in almost all working groups. This will be discussed at the Committee Meeting; but, all AdSubCom members are requested to send suggestions to the Chairman.

15. The meeting was adjourned about 11:00 p.m.

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**REPORT OF THE COMMITTEE CHAIRMAN**

**IEEE/PES TRANSFORMERS COMMITTEE**

APRIL 10-13, 1988
WASHINGTON, D. C.

Welcome to Spring Time in the South!

We certainly hope "y'alll" will have a good time in the Nation's Capitol and that you have scheduled adequate time to both visit the sites of interest and to attend all of our meetings of interest.

Your Administrative Subcommittee has been doing a splendid job and have required very little of the Chairman in the past six months.

As usual, our Transformer Technical Sessions went well at the 1988 Winter Power Meeting. Bob Veitch did his usual super job in getting papers peer reviewed, scheduled, and presented. I want to thank all of those who had a part in making the peer review process a success. Normally, we are allotted only enough pages in the Transactions to publish one-half of the papers offered. This means that the peer reviewers have a real responsibility for weeding out papers of less merit or less general interest. So, reviewers, remember that we depend upon your good judgement to keep our Technical Sessions at a high level of usefulness to the transformer community. We are not in the business of assuring publication of papers; rather, we want to disseminate only the most useful information.

Although the Technical Council meeting at the 1988 Winter Power meeting continued until almost midnight, only a few items of importance to us were discussed. We still have a bottle neck in getting papers presented at the Anaheim T & D Conference published. This happens regularly in the years after a T & D Conference. For some reason, there are never enough pages of the Transactions allotted to this event. We expect things to settle down -- just before the New Orleans T & D Conference.

There has been much activity concerning papers presented at the T&D Conference. The subject has moved on to the Executive Board. Current plans involve a new format for the 1991 T&D Meeting with a "Conference Paper" format. The 1989 meeting will remain as previously. Some additional effort will be made to have some "special papers in 1989.

A draft of a proposed, new Technical Council Procedures Manual to serve as a "mother Document" for the Technical Committees' individual Committee Procedures Manual has been promised for delivery to the Committee Chairmen prior to the Summer General Meeting.

A proposal to place the authorization of Committee Scope changes in the hands of the Procedures Committee failed. Scope approval will remain the prerogative of the Technical Council Chairman and the Technical Council.

A review of the five-year totals of papers submitted vs. papers accepted produced some interesting information. The Transformers Committee has hewed the line on the recommendations of the Technical Council Chairman and have held our acceptance rate to 47.4% (compared to a recommended 50%.) Not so for some other committees. Other selected percentages were:

Power System Communications .....100
Nuclear Power Engineering.....78.6
Power Generation.....70.2
Substations.....69.7
Switchgear.....65.2
Surge Protective Devices.....61.9
Power Systems I&M.....58.4
Insulated Conductors.....56.4
Power System Relaying.....55.3
Rotating Machinery.....53.8
T&D.....50.6
Power Systems Engineering.....47.1

Based on this information, we will make a special effort to assure that every worthy paper submitted will be presented, even if we exceed the recommendations.

Viewgraphs or overhead projectors are still not allowed in the New York sessions. VCRs were used to good effect on an experimental basis. The Technical Sessions Improvement Committee is trying to solve the viewgraph problem. Currently, they want to have all audio-visuals pre-reviewed before presentation.

I hope you have all reviewed the scopes of your groups. Please be sure to include all the things you do -- but be careful -- don't go outside the scope of the Committee or Subcommittees.

I have received no support for a spring celebration of our 40th anniversary. Perhaps it wasn't a good idea. For whatever reason, I apologize for not making a greater effort.

I continue to get a trickle of resignations from members, all of whom seem younger than me, who are retiring. We will miss the sage advice, active membership, and friendly fellowship of these good friends. I do appreciate their thoughtfulness in keeping us informed of their status.

In this vein, I urge our Subcommittee and working group officers to carefully verify the accuracy of their membership rosters. Then, notify our secretary, John Bergeron, promptly of any changes. All of those in attendance are requested to carefully review the membership and the invitational lists. Please let John Bergeron know of any errors. Please look not just for your name; but, also, for any errors in the listing of your acquaintances. Note: If you give these to John in written form, I know he would appreciate it.

The IEEE Standards Board proposed to hold an IEEE Transnational Forum on Standards in Reno Nevada October 17-21. They wanted as many committees as possible to hold concurrent meeting there. I notified them that our Fall, 1988 meeting was already scheduled as were other meetings through 1991. I also pointed out that utility managements, at least, took a dim view of meetings in Reno, Los Vegas, and Atlantic City. I understand they received the same message from a multitude of other technical committees. I don't know the current status; however, it's doubtful if the 1988 Forum will be held. We need to know if there is interest in the presentation of panel discussions or special topic sessions at the New Orleans T & D Conference. If such interest exists, we need to identify persons who will be responsible for developing such programs. Please discuss this and give Bob Veitch your comments.

We have had some good work done by the hosts for our future meetings. The current schedule, according to my notes, is as follows:

November 6-9, 1988 Long Beach CA Ramada Renaissance Hotel
Host: Carl Hurty

April 2-5,1989 Chicago IL Drake Hotel
Host: Len Stensland

Fall 1989 Charlotte NC
Host: W. E. Saxon

March 25-28, 1990 Denver CO Denver Marriott- City Center
Host: Felix Cook, Sr.

Fall 1990 Montreal Quebec
Host: George Vaillancourt

Having hosted the Williamsburg VA meeting, I'm well aware of the problems of being a host. I appreciate the efforts of each of you.

Respectfully submitted,

Olin Compton

ATTACH. AD COM
4/88
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# DIELECTRIC TESTS SUBCOMMITTEE ACTIVITIES
## ADMINISTRATIVE SUBCOMMITTEE - 4/11/88

1. Membership - 56

   L. S. McCormick has elected early retirement and has resigned from the Committee.

2. Propose Ed Howells for membership in the Transformers Committee. Ed has been chairing the Task Force for Acoustic Detection of Partial Discharge. His application is lost in the US Mail.

3. Standards Activities

   a. Bill Kennedy - PC57.21a - Section of the Shunt Reactor Test Code.

      Was scheduled for simultaneous balloting of the TF and Subcommittee. Did not happen because of mailing list complications.

      Was balloted in the Performance Characteristics Subcommittee. Bill received some comments from that ballot which will be discussed during the DC meeting and incorporated for ballot prior to Long Beach.

   b. Bob Veitch - PC57.12.00j - External Phase-to-Phase Clearances for Power Transformers. Bob, filling in for Jim Douglass, processed a joint ballot of the TF and Subcommittee.

   c. Bill Henning - PC57.12.90c - Routine Impulse Test for Distribution Transformers. Further discussion is scheduled for DC.

      I quote from Bill's letter.

      "At our future meeting on April 11, when we discuss Draft 5 of the routine impulse test proposal, the subject I would like to address is the scope of the proposed test. From the beginning we defined the scope as 'applying to all transformers covered by the C57.12.20 series of product standards.' It was called to my attention, however, that the voltage ratings covered in C57.12.20 include ratings to 67,000 volts, 350 kV BIL. ..."

d. Ed Howells - 9th Draft of the proposed Guide for Acoustic Detection of Partial Discharges. The PAR application was sent 11/23/87 by Jim Harlow. PAR Number PC57.127 was received by Ed on 4/5/88. Therefore no ballot was attempted.

4. Standard Requirements for Instrument Transformers

A Round Table Discussion is scheduled for Tuesday at 8 AM.

Outcome of this meeting should be determination of future action and the proper area of responsibility.

Robert E. Lee
Robert E. Lee
April 6, 1988

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SALT RIVER PROJECT

POST OFFICE BOX 52025
PHOENIX, ARIZONA
85072-2025
(602) 236-5900

September 12, 1988

Mr. John J. Bergeron
Louisiana Power & Light
P. O. Box 60340
New Orleans, LA 70160

Dear John:

IEEE WEST COAST TRANSFORMER SUBCOMMITTEE MEETING FEBRUARY 18, 1988

Membership:

David Sundin and Bill Isberg were accepted as members. Steve Benko has resigned due to retirement.

New Business:

The scope of West Coast Subcommittee received a minor modification and will be submitted as modified.

Working Group Reports:

**Working Group on Transformer Loss Evaluation - C57.120**

Draft D14 has been balloted. As of February 18, 1988, results of the balloting of the main committee were as follows: Of 112 ballots sent, 55 were returned with one being negative. It is anticipated that the negative ballot can be resolved.

**Working group on Consolidating of Installation guides for Power Transformers - C57.93**

The guide has been defined to include transformers above 501kVA and 1,000 V secondary. Writing assignments have been made and specific format will be discussed at Summer Power meeting. Scope has also been changed from oil-filled to liquid-filled transformers. Maintenance will also be included.



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**Working Group on Transformer Fire Protection**

The PAR, scope, and preliminary outline have been developed and were distributed to members. The PAR will be submitted for approval. Writing assignments have been made for the various sections of the Guide.

**Working Group on Seismic Guide for Power Transformers - C57.114**

West Coast Subcommittee balloted Draft D16. Comments received were primarily editorial and will be included in Draft D17. This draft will be balloted simultaneously at the Subcommittee and Main Committee levels.

The next meeting of the Subcommittee will be at the November meeting of the Main Transformer Committee in Long Beach, California.

Sincerely,

Dennis Gerlach
Chairman
West Coast Subcommittee

DWG:bs

ATTACH 4/88-B
P1 of 2

IEEE Transformers Committee
Liaison Report
Standards Coordinating Committee
Power Engineering Society
February 1, 1988
New York, New York

The PES Standards Coordinating Committee met during the IEEE Winter Power Meeting. In attendance were 11 of the 15 officers and designated technical committee representatives, plus four guests.

The following topics are of note:

1. IEEE Standards Signature Policy Program. This program, also known as the Indemnification Program has been formally "temporarily suspended." The prevailing attitude is that it will not be reestablished in any form.

2. Audit Committee. This committee has been discontinued along with the Signature Policy Program.

3. Standards Funds Solicitation Program. This is a newly proposed program, the details for which are still nebulous. Some points:

   a. The idea is that IEEE would solicit funds from corporations to defray the cost of publishing standards.

   b. The present year deficit is $1,000,000. Of this, $400,000 is a write off of excess inventory.

   c. The Standards Board voted the question down noting that IEEE is a professional, not a trade, association. They raised a concern over potential corporate influence in standards writing.

   d. The Board of Directors approved the concept, overriding the Standards Board.

   It is requested that the mood of the committee be voiced and reported to the SCC Chairman.

4. The NesCom secretary, Mrs. Louise Germani is leaving IEEE and going to ANSI. She will be replaced by Mr. Robert Pritchard in an acting capacity while a search continues for a permanent replacement.

5. Regarding the publishing of standards and effectivity date.

   The Standards Office (Judith Gorman) distributed a letter December 22, 1987 stating that as of January 1, 1988 any newly published IEEE Standard will display in the

designation, the year of Standards Board approval rather than the year of publication.

The possible confusion resulting from this is evident: If a revised standard is dated 1986, but published in 1988, does the old or new edition of the standard apply to a product made and sold in 1987?

Ms. Gorman answered this point by noting that "any standard is officially an IEEE application once it is approved and that drafts are widely available to users, even if the edited/published version is not."

The question is moot if, as is the standards office objective, the standards are published with no more than a 3 month lag between approval and publication.

The consensus of the SCC was that this policy should not be implemented while there is a two year lag existing. A formal request will be made through the Technical Council to defer the new policy until the publication backlog has been eliminated.

In this regard be aware that the IEEE offers to publish approved IEEE standards before ANSI approval. At this time, at least the Substation and Relay Committees are doing this.

6. A new IEEE Standards Manual is scheduled for early 1988 issue.

7. Following is the proper procedure to be followed when a question arises regarding an interpretation of a standard.

   a. Question is to go to secretary, IEEE Standards Board.

   b. The Standards Board sends the question to the appropriate technical committee.

   c. The TC prepares an answer and replies to the Standards Board.

   d. The Standards Board prepares the formal response to the questioner.

J. H. Harlow
Chairman, Standards Subcommittee
March 22, 1988

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To: Members of Transformers Committee,
Administrative Subcommittee,
April 11, 1988

Subject: Status Report - Transformer Standards

Following are topics of interest for period November 3, 1987 - April 11, 1988:

1. Active Transformers Committee Projects. A listing of all reported project activity by subcommittee is included as attachment.

2. The complete PES Standards Coordinating Committee liaison report has been submitted to the chairman for inclusion in the minutes. As follow-up to item 5 in that report regarding the effectivity date on newly publish standards: The policy, which would date standards to approval, rather than publish date starting January 1, 1988, was implemented on a few "one page supplements". The policy will not be further implemented until the present backlog is eliminated.

3. Liaison with other PES Technical Committees established in period.

| TC | Project | Liaison Representative |
|---|---|---|
| SPD | C62.92.5 Application Guide for Neutral Grounding of Transmission and Subtransmission Systems. | C.R. Hoesel |
| SPD | C62.92.4 Application Guide for Neutral Grounding of Distribution Systems. | C. V. Brown |
| SUB | Guide for specification of HVDC Transient Performance, Faults and Switching. | W.N. Kennedy |

4. I contacted Mr. Hugh D. Thuerk, Secretary, Executive Standards Council, ANSI, regarding the intent to withdraw 5 standards of interest to the Transformers Committee on the basis of their having not been revised or reaffirmed since December 31, 1977. Briefly:

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P2

A. C57.12.10-1977 and C57.12.30-1977. I advised that C57.12.10-1987 was approved June 4, 1987 and that the revision includes consolidation of C57.12.30.

B. C57.16-1958(R1971). A major revision is planned to start in 1988.

C. C57.106-1977. Work on a revision is proceeding.

D. ANSI/IEEE 21-1976. Work on a revision is nearing completion under the new designation PC57.19.00.

A response of January 21, 1988 states only that he will respond later with detailed information on Executive Standards Council actions.

5. The PES has a new publication "Computer Applications in Power" which will include a "Standards Corner." Anyone preparing a standard on a topic related to computers is invited to submit a 500 word article.

6. ANSI "Standards Action" reports the following newly published standards which may be of interest to Transformer Committee personnel (October 23, 1987 to March 11, 1988).

- o ANSI/IEEE 980-1987, Guide for Containment and Control of Oil Spills in Substations.
- o ANSI/IEEE 799-1987, Guide for Handling and Disposal of Transformer Grade Insulating Liquids Containing PCBs.
- o IEC 551:1987, Determination of Transformer and Reactor Sound Levels.
- o IEC 905:1987, Loading Guide for Dry-Type Power Transformers.
- o ANSI C92.2-1987, Power Systems - Alternating Current Electrical Systems and Equipment Operating at Voltages above 230 kV Nominal - Preferred Voltage Ratings.

J. H. Harlow
Chairman, Standards Subcommittee

JHH:oc

Subcommittee: Audible Sound and Vibration
Subcommittee Chairman: Allan M. Teplitsky (212/460-4859)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P523 | PC57.112 | A. Teplitsky | Guide for the Control of Transformer Sound | Yes (8/73) | 11/3/87 - Work not yet started. | |
| | PC57.12.90b | | Transformer Sound Power Measurement | Yes (3/86) | 11/3/87 - Summary of proposed changes to be distributed for comments. | RM |

Subcommittee: Bushing
Subcommittee Chairman: Loren B. Wagenaar (614/223-2259)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P21 | PC57.19.00 | L. B. Wagenaar | General Requirements and Test Procedures for Outdoor Apparatus Bushings (Rev. of ANSI C76.1) | Yes (4/79) | 11/3/87 - D/7 ballot of Trans. Comm. being resolved by subcommittee | SMGR T&D PSR IC |
| P757 | PC57.19.101 | F. E. Elliott | Guide for Loading Apparatus Bushings | Yes (5/78) | 3/31/88 - IEEE has declined to publish as a separate trial use guide. | PSR SMGR SUB |
| P800 | PC57.19.100 | F. E. Elliott | Bushing Application Guide | Yes (4/79) | 11/3/87 - Discussion centering on drafts regarding the application of bushings in contaminated environments and maintenance of bushings. | SMGR SUB PSR |
| | | | WG Bushings for HVDC Applications | None Required | 11/3/87 - To work with HVDC Converter Transformers and Smoothing Reactors Subcommittee re special problems on dc bushings. | |
| | | L. D. Miller | TF Bushings for Distribution Transformers | None Required | 11/3/87 - To determine if need exists for standardization of these bushings. | |

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C-88/4

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

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| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| | - | H. R. Moore | WG on Revision of Dielectric Tests | - | - | - |
| | PC57.21a | W. N. Kennedy | TF on Revision of Dielectric Tests of Shunt Reactors | Yes (2/86) | 11/3/87 - Discussion on D/5A. Several revisions planned. | None |
| | PC57.12.00j | R. A. Veitch | TF on External Phase to Phase Clearances for Power Transformers | Yes (2/86) | 11/8/87 - Reconciling negative ballots on D/6 at WG level | None |
| | PC57.98 | J. J. Bergeron | TF Revision for Guide for Transformer Impulse Tests | Yes (2/86) | 11/3/87 - Discussion re digital techniques and switching test; preparing the first draft. | None |
| | - | C. V. Brown | WG for Revision of Dielectric Testing of Distribution Transformers | - | | - |
| | PC57.12.90c | W. R. Henning | TF on Routine Impulse Test for Distribution Transformers | Yes (9/87) | 11/3/87 - Discussion re. D5, para. 10.4.2 & 10.4.8 | RM PSC |
| | - | G. H. Vaillancourt | WG on Partial Discharge Tests for Transformers | - | - | - |
| P545 | PC57.113 | G. H. Vaillancourt | TF on Guide for Partial Discharged Measurements in Liquid Filled Power Transformers and Shunt Reactors | Yes (4/87) | 11/3/87 - Document to be printed early 1988. | None |
| | - | W. J. Carter | TF for Measurement of Apparent Charge | None Required | 11/3/87 - Organized to develop format to be used for collection of apparent charge data. | |
| | PC57.127 | B. Howells | TF on Guide for the Detection of Accoustic Emissions From Partial Discharges in Oil-Immersed Power Transformers | Yes (3/88) | 11/3/87 - D9 ready to submit to ballot. 3/9/88 - NesCom approval of PAR. | - |
| | - | R. E. Lee | TF on Low Side Surge Requirements for Distribution Transformers | None Required | 11/3/87 - In process of defining problem, gather and analyse data. Determine if test is required. | |

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

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PRS COORD. |
|---|---|---|---|---|---|---|
| | C57.21 (contribution) | R. Dudley | Loading Dry Type Reactors | None Required | 11/3/87 - Review of D/6A of C57.21 | None |
| P259 | None | A. M. Iverson | Standard Test Procedure for Evaluation of Systems of Insulation for Specialty Transformers | No | 11/3/87 - D/2 discussion | ? |
| | PC57.12.01 | E. Koenig | General Requirements for Dry Type Distribution and Power Transformers | Yes (7/82) | 11/3/87 - Discussion re negative ballots of D4 from Transformers Committee. | None |
| | PC57.96 | W. H. Mutschler | Guide for Loading Dry Type Distribution and Power Transformers | Yes (2/81) | 4/88 - Revision submitted to RevCom. | PRR PRIM |
| | PC57.124 | A. D. Kline | Recommended Practice for Measuring Partial Discharge and Measurement of Apparent Charge in Dry-Type Transformers | Yes (1/86) | 11/3/87 - Editorial revisions continue | None |
| | PC.57.12.60 | G. H. Bowers | Standard Test Procedures for Thermal Evaluation of Insulation Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers | Yes (11/85) | 5/12/87 - Unable to fully resolve W.G. and Sub Com ballot | Unclear |
| P1052 | PC57.12.59 | R. E. Uptegraff | Dry-Type Transformer Through Fault Current Duration Guide | Yes (84) | 5/12/87 - Has been approved by StB. Held pending PC57.96 revision | PSR SMGR |
| ? | ? | G. L. Bowers | TF on Flammability and Toxicity | No | 11/3/87 - No activity at New Orleans. | ? |
| | PC57.12.58 | A.D. Kline | Guide for Conducting Transient Voltage Analysis of a Dry Type Transformer Coil | No | 10/12/87 - Returned by StB for endorsement by IAS and IEC | ? |
| | C57.94 | R.E. Uptegraff | Recommended Practice for Installation, Application, Operation and Maintenance of dry-type, general purpose distribution and power transformers | None Required | 12/21/87 - Document reaffirmed by RevCom. | |

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D-88/4

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

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| | | W. Kennedy | Dielectric Tests for HVDC Transformers and Reactors | No | 11/2/87 - Discussion regarding dielectric testing and harmonic losses. | |

Subcommittee: Instrument Transformers
Subcommittee Chairman: Ralph B. Stetson (603/692-2100)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P546 | PC57.13 | R. B. Stetson | Standard Requirement for Instrument Transformers | Yes (5/80) | 5/12/87 - Negative ballots on D/5 being addressed | PSIM PSR SPD |
| P670 | C37.077 | J. G. Reckleff (Joint W/Swgr) | Requirement for Current Transformers for use with AC-High-Voltage Circuit Breakers | No | 5/12/87 - Negative ballots on D/6 being compiled | ? |
| P832 | PC57.13.4 | R. B. Stetson | Detection of Partial Discharge and Measurement of Apparent Charge Within Instrument Transformers | Yes (10/79) | 5/12/87 - No activity in Ft. Lauderdale | T&D |

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

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| | PC57.106 | H. A. Pearce | Guides for Acceptance and Maintenance of Insulating Oil in Equipment | Yes (4/86) | 5/12/87 - Basis of revisions survey results presented | None |
| | PC57.104 | H. A. Pearce | Guide for the Detection and Determination of Generated Gases in Oil-Immersed Transformers and Their Relation to the Serviceability of the Equipment | Yes (12/81) | 5/12/87 - Revisions continue | PSR T&D |
| P954 | PC57.121 | H. A. Pearce | Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid in Transformers | Yes (12/81) | 2/22/88 - Submission approved by RevCom. | T&D PSR |
| | PC57.111 | H. A. Pearce | Guide for Acceptance and Maintenace of Silicone Insulating Fluid in Equipment | Yes (12/87) | 3/21/87 - New PAR approved by NesCom. | T&D PO |

C-88/14

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

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| | PC57.95 | W. E. Wrenn | Guide for Loading Oil-Immersed Step-Voltage and Induction Voltage Regulators | No | 11/3/87 - To be published early 1988. | ? |
| | PC57.91 | W. E. Wrenn | Guide for Loading Mineral Oil-Immersed Transformers | Yes (3/85) | 11/3/87 - Inputs of 4 TF being reviewed. | Sub T&D PSR |
| | | A. C. Wurdack | Standard Test Procedure for Thermal Evaluation of Oil-Immersed Power Transformers Rated Less Than 100MVA | No | 11/3/87 - D/1 discussed. 12/10/87 - PAR recinded for 57.126. New PAR to be submitted as revision to C57.100. | |
| P838 | PC57.119 | R. L. Grubb | Recommended Procedures for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Rating | Yes | 11/3/87 - D/10 and tutorial appendix discussed. | SWGR SUB PSR |

Subcommittee: Performance Characteristics
Subcommittee Chairman: John D. Borst (314/634-2111)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P638 | None | L. R. Stensland | Qualification of Class 1E Transformers for Nuclear Power Generating Stations | Yes | 11/3/87 - Coordination with SC-2 leading to D16 | NPE SUB |
| | PC57.18.10 | C. G. Pounds | Practices and Requirements for Semiconductor Power Rectifier Transformers | Yes (6/81) | 11/3/87 - D/6 discussion | None |
| P786 | PC57.117 | H. F. Light | Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems. | Yes (2/79) | 12/8/87 - To be published early 1988 | T&D NPSC PG |
| | PC57.21 | J. W. McGill | Requirements, Terminology, and Test Code for Shunt Reactors Over 500 kVA | No | 11/3/87 - D/5A WG ballot results discussed. 3/14/88 - P,R request to NesCom | RM |
| P785 | PC57.116 | B. K. Patel | Guide for Transformers Directly Connected to Generators | Yes (2/79) | 11/3/87 - D/10 reviewed. | PG PSR RM NPE |
| P262 83 | PC57.12.90 e3 | W. R. Henning | C57.12.90e3 - Revision of C57.12.90 Section 8 - "No Load Losses and Exciting Current" | No | 11/3/87 - Small changes. Now ready to be balloted. | ? |



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P9

Subcommittee: Performance Characteristics (PC)
Subcommittee Chairman: John D. Borst (314/634-2111)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P262 E2 | PC57.12.90 | W. R. Henning | Revision of C57.12.90 Section 8.3.3 | No | 4/2/87 - D/8 approved by TC 1985. Text held pending C57.1290e3 project. | ? |
| P262 E1 | PC57.12.90 e1 | W. R. Henning | Addition to C57.12.90 Section 8 | No | 4/2/87 - D/4 text being held pending C57.12.90e3 project. | ? |
| P262 E | PC57.12.90e | W. R. Henning | Revision of C57.12.90 Section 9 - Load Loss and Impedance Tests | No | 11/3/87 - Draft discussed by WG. | ? |
| P1098 | PC57.123 | W. R. Henning | Guide for Transformer Loss Measurement | Yes (3/85) | 4/2/87 - Work awaiting conclusion of C57.12.90e | PSIM |
| P462C | PC57.12.00 | W. R. Henning | Supplement for Allowable Loss Tolerances and Methods of Loss Measurements | No | 11/3/87 - Proposal pending for round-robin test. | ? |
| | PC57.125 | D. J. Cash | Guide for Failure Investigation, Documentation and Analysis for Power Transformers and Shunt Reactors | Yes (2/87) | 11/3/87 - D/5 WG ballot discussed. | T&D PCB PSE SMCR |
| | | R. H. Frazer | TF - LTC Position Indication | No | 11/3/87 - New project coordinator | |
| | | J. W. Matthews | TF - Namplate Information "Directed Flow" | No | 11/3/87 - Awaiting input from Loading Guide WG. | |
| | | C. J. McMillen | TF - Routine Resistance Test C57.12.00K, Table 14 | No | 11/3/87 - Review results of ballot | |

2-88/4 D10

Subcommittee: Standards
Subcommittee Chairman: James H. Harlow (601/939-0550)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P801 | PC57.15 | J. Harlow | Requirements, Terminology and Test Code for Step-Voltage and Induction Voltage Regulators | Yes (6/79) | 11/3/87 - To be printed early 1988. | SUB SPD |

Subcommittee: West Coast
Subcommittee Chairman: Dennis Gerlach (Telephone 602/236-5483)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P513 | PC57.114 | S. Oklu | Seismic Guide for Power Transformers and Reactors | Yes (7/73) | 7/16/87 - Draft being balloted by Subcommittee. | NPE Sub |
| P842 | PC57.120 | R. Jacobsen | Loss Evaluation Guide for Power Transformers and Reactors | Yes (5/80) | 7/16/87 - D/14 sent for Transformers Committee ballot. | Sub RM PG |
| | PC57.93 | D. Johnson<br>J. Gillies, VC | Guide for Installation of Liquid Immersed Power Transformers (Including C57.12.11 and C57.12.12 Consolidation) | Yes (6/82) | 7/16/87 - No activity. | None |
| | | H. Johnson | Fire Protection of Outdoor Liquid Immersed Power Transformers | No | 7/16/87 - Discussion getting started. | |

11501 D-88/17

ATTACH 4/88-D
Sh 1 of 14

PERFORMANCE CHARACTERISTICS SUBCOMMITTEE
Washington, DC - April 12, 1988

MEETING MINUTES

I. INTRODUCTION/ATTENDANCE

The Performance Characteristics Subcommittee (PCS) met at 11:15 AM on Tuesday, April 12, with 37 members and 36 guests registering their attendance.

II. APPROVAL OF MINUTES

The minutes of the November 3, 1987 PCS meeting were approved as submitted.

III. CHAIRMAN'S REMARKS

1. New Members since last meeting:

   Tom Traub - Commonwealth Edison
   Dana Basel - Westinghouse

   After the meeting, Sheldon Kennedy, Niagara Transformer, requested PCS Membership.

2. Liaison Reports

   None submitted.

3. PCS Member Olin Compton has been elevated to the Fellow Grade "for contributions in the development of standards for transformers and associated substation equipment".

4. Administrative Subcommittee Items

   a. The Spring 1989 Meeting (Chicago) is presently in conflict with the 1989 IEEE T&D Conference (New Orleans).

   b. The Standards Subcommittee status report for PCS projects is attached for information and/or input. (Attachment PCS-A).

c. The Administrative Subcommittee approved formation of a PCS Task Force to investigate LTC electrical requirements as requested by T.P. Traub (Attachment PCS-B). Initial steps will include scope definition, IEC 214 review and work group formation if necessary.

d. By request of the Chairman, it should be noted that the PES Standards Coordinating Committee has requested input on a "Standards Funds Solicitation Program" to defray the publishing costs of standards. This will be presented by Jim Harlow at the Main Committee Meeting.

e. There is consideration for expanding the Transformer Committee format to 4 days; this will be discussed at the Main Committee Meeting.

f. The Scope of the PCS has been reaffirmed as follows:

"Treatment of loss, impedance, exciting current, inrush current, and other performance characteristics, and their methods of measurement or test for liquid filled transformers and reactors".

V. WORKING GROUP REPORTS

1. Qualification of Transformer for Class 1E Application in Nuclear Power Stations - L.B. (Len) Stensland

The working group met on April 11, 1988, with four members and one guest present. We welcomed our newest member L.W. Pierce.

The working group issued P638 Draft 16 for ballot on April 8 to members of NPEC/SC-2 and IEEE Transformers Committee. We would appreciate your prompt reply. Hopefully, we will have a successful ballot and be able to finally complete with task.

Mr. Stensland noted that he does not have a copy of the project PAR; the PCS Chairman will attempt to locate it.

2. Transformers Directly Connected to Generators - B.K. (Bipin) Patel

The Working Group met at 1:05 PM on April 11, 1988 with 8 members and 8 guests present.

The latest draft of the Guide will be revised with the editorial comments discussed. Rewording of Section 4.3 will be passed around in the Working Group for the members review and the draft will be finalized. This final draft is expected to be submitted to the Standards Review Board in May. No more regular Working Group Meetings are planned; no new business was discussed.

3. Test Code For Shunt Reactors (C57.21) - J.W. (Jack) McGill

This working group met at 3:05 PM on April 11, 1988, at the Radisson Park Terrace Hotel in Washington, D.C. There were 9 persons present; 7 members and 2 guests. Minutes of the last meeting were approved.

The final ballots from this working group on Draft #5A were received just after last Fall's Meeting in New Orleans. The results of this ballot were as follows:

| | |
|---|---|
| Approved with comments | 6 |
| Approved no comments | 4 |
| Negative | 2 |
| Not Voting | 3 |
| Total | 15 |

The two negative votes objected to the ommission of the front-of-wave testing on oil-immersed shunt reactors. There were also many other comments on Draft #5A that were discussed in the New Orleans meeting. It was decided that Draft #6 was necessary to add the front-of-ware tests and to modify Draft #5 to include all the comments discussed in the previous meeting.

Draft #6 was reballotted in the Working Group prior to this meeting. The results are as follows:

| | |
|---|---|
| Approved with comments | 5 |
| Approved no comments | 6 |
| Negative Vote | 1 |
| Not Voting | 3 |

During this meeting we discussed the one negative vote and also the many comments on Draft #6. The negative vote objected to using the average value of losses on multiunit orders for guarantee purposes on oil-immersed units only. The person that sent the negative vote was not present at this W. G. Meeting, but the group decided that the following sentence would satisfy the negative vote. "On multiunit orders, the average value for losses should be used for guarantee purposes, unless otherwise specified differently by the user." The Chairman will check with the person presenting the negative vote if the above sentence would satisfy his wishes.

There were numerous comments (approximately 40) that were discussed and each one was resolved during this meeting. Some were of a minor nature while others were major corrections. The following are some of the major items discussed:

1) The 55°C rise shunt reactors are still eliminated from this standard. Only 65°C rise units are addressed.

2) All the paragraphs referring to reduced voltage testing remain as written in Draft #6.

3) Tables #2 & #3 on dry-type shunt reactors were modified in accordance with the dry-type Task Force recommendations.

4) In tables 4A & 4B those tests which indicate "when specified" were changed from "design" tests to "other" tests. Also the addition of seismic verification on Table 4B was considered unnecessary at this time.

5) The segregation of losses into $I^2R$, eddy and clamping structures was changed from a "must" clause to a "may" clause.

6) It was decided not to add a section on winding capacitance in conjunction with power factor testing.

7) The present standard requires testing at 100% voltage for vibration and sound levels to verify guaranteed values. It was decided that 105% voltage testing should be specified by the user, if desired.

8) A section on control wiring was added to state that a minimum of 600 volt control wiring is required.

The above changes plus the many other corrections will be incorporated into Draft #7 and then balloted in the subcommittee. The meeting lasted much longer than normal and was adjourned at 6:00 PM.

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

The Working Group met in Washington, D.C. at the Park Terrace Hotel on April 11, 1988 at 1:00 PM. There were 24 members and 28 guests present. Following introductions of members and guests, Chairman Don Cash announced the addition of 6 new members to the work group They are Allan Bartek, Rowland Jamps, Jr., Stanley Osborn, Charles Raymond, Nick Tirlea and David Truax. The minutes of the November 2, 1987, meeting in New Orleans were approved as presented. Chairman Cash announced the appointment of W.B. Binder as T.F. Chairman.

The work group discussed the question of balloting Draft 6 at the subcommittee level. The consensus was to ballot Draft 6 at the Working Group level.

W.B. Binder reviewed the T.F. minutes from the February meeting in Detroit. The Task Force discussed the two negative ballots on Draft 5 and incorporated all appropriate comments from the ballot. Further work was believed necessary to resolve one negative ballot. The Task Force has a volunteer to expand the appendix on Electrical Tests. This effort will be reviewed by the Task Force at a July meeting and issued for ballot to the Working Group in time for the November Meeting.

During the Working Group Meeting, we revieved changes that have already been made.

Harold Light has requested that this Working Group take over the failure reporting effort which is the next step in data collection; this will be taken under advisement and reviewed at the next meeting.

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

The Working Group on Loss Tolerance and Measurement met at 3:05 PM with 22 members and 13 guests present. The first item of business was to review the progress of the Task Force, which is revising Section 8 and Section 9 of C57.12.90 and then plans to write a loss measurement guide.

The Section 8 proposal is completed and awaits completion of Section 9. The Working Group reviewed the contents of Section 9. The proposal imposes limits on some of the test conditions. Many of these are in the present standard, but some new ones were added to the proposal. The new ones are a tolerance on frequency of 0.5%, a limit on phase error correction of 5%, and reference to a measurement assurance program. The Working Group discussed the 5% limit on phase angle error correction. It appears different limits will be required depending upon the apparent power factor of the transformer under test. To help in determining the magnitudes of these corrections, a survey will be conducted.

The next subject was the use of the bridge method in measuring losses. It was agreed that the bridge method should not be used to measure no-load losses because the haromic content of the excitation current prevents proper balancing of the bridge. The bridge method can be used in the load loss test because the test current is a sine wave. For a three phase transformer, we will specify three phase excitation and switching of the bridge to each phase.

The Working Group also discussed the question of a tolerance on the test current; hov close to rated current must the test be carried out? To help answer this, the question will be added to the survey.

The Working Group must now decide whether we should make any changes to Section 5 on resistance measurement and to Section 9.5 on zero sequence impedance test. The chairman will solicit comments on what changes are needed.

The last subject discussed was a proposal for making the resistance test a design test for distribution transformers rated 501 kVA to 2500 kVA, while the load loss and impedance test will remain a routine test. Objections to this proposal were based on its impact on accuracy of the load loss test. A proposed correction method has been added that uses the design-test stray losses to make the correction. Example calculations that were prepared will be sent to the Working Group members for evaluation. The meeting adjourned at 5:15 PM.

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

The Working Group met on Monday, April 11, 1988, at Washington, D.C. There were 12 members and 7 guests in attendance. The minutes of the November 2, 1987 meeting in New Orleans were approved as read.

The Working Group reviewed two technical papers by E.V. DeBlieux of General Electric which give background on load loss determination including harmonic effects for single way style rectifier transformers and recommendations on performing load loss tests using sine wave currents of fundamental frequency equal in magnitude to the RMS value of the rated theoretical square wave current of the AC side windings. The loss testing recommendations by DeBlieux form the basis for both past and present practice (ANSI C57.18 - 1964, R-1971 & IEC 146-1973).

The Working Group decided that load loss testing should continue to be performed per present practice as load losses can be measured directly and segregated into $I^2R$ and stray loss. It was decided that an appendix would be added to cover determination of harmonic current magnitudes and escalation of stray load loss for each winding of single and double way style rectifier transformers. This information will be used along with

temperature rise measurements made by 60 HZ tests, to report expected losses and temperature rise of the rectifier transformer under actual operation. Guaranteed losses shall continue to be determined and reported per the present practice (from 60 HZ sine test, adjusted to standard reference temperature).

Direct measurement of harmonic loss at each harmonic frequency by injection of sine wave currents of the appropriate magnitude for each harmonic to which the windings of the rectifier transformer are subjected was proposed. It was recognized that this technique has been successfully used for 6 pulse HVDC converter transformers of the double way variety. It was also recognized that the harmonic magnitudes that exist in each winding of single way and some double way configurations are not the same, as harmonic cancellation takes place in the primary winding. Furthermore, many manufacturers of rectifier transformers do not have facilities to perform such tests. This technique will be reviewed before the next meeting and possibly be included in the revised draft of the standard as an alternate method of load loss measurement.

Temperature rise test procedures and temperature limits as proposed by Table 10 for overload duty cycles will be reviewed. The proposed temperature limits of Table 10 are less conservative than previous values (less margin for harmonic effects). Load cycle profiles will be added for clarity.

Dielectric Tables 4 & 6 will be reviewed and checked against other standards.

Problems with rectifier transformers equipped with LTC's were discussed (harmonic loading of components, etc.). It was decided to refer this problem to the Performance Characteristics Subcommittee for guidance as to whether these problems should be addressed by the Semiconductor Rectifier Transformer Working Group.

Plans are to review Draft 6 to reflect the above changes and send it out to the Working Group for comment before the Long Beach, Ca. meeting.

7. Transformer Reliability - D.J. (Don) Cash for H.F. (Harold) Light

The Working Group met very briefly on Monday, April 11, 1988, at 3:05 PM with 12 in attendance. Don Cash filled in for Chairman Harold Light who was still unable to attend.

Harold submitted a letter which was distributed at the meeting. He reported on the status of C57.117 (Guide for Reporting Failure Data). With the publication of this document, the Working Group has completed its work and will not meet in the future. There being no further business, the meeting was adjourned.

VI. PROJECT REPORTS

1. LTC Position Indication - R.H. (Bob) Frazer

Bob summarized the problem that LTC taps are not consistently labeled per C57.12.00 - Nameplate Notes. The "raise/lower" terminology is dependent on which winding has the taps and is further complicated by reverse power flow.

A PCS survey will be conducted which will cite the possibility of three cases as follows:

CASE I Existing Nameplate Terminology

"Raise" Raises output voltage level
"Lower" Lowers output voltage level
NOTE: (stepup or stepdown, primary or secondary LTC)

CASE II

"Raise" Raises input voltage level
"Lower" Lowers input voltage level
NOTE: (stepup or stepdown, primary LTC only)

CASE III (at request of user)

Reverse power flow
"Raise" Raises turns ratio
"Lower" Lowers turns ratio

Nameplate shows maximum voltage for all windings.

Table shows turn ratio for each LTC Position

2. Nameplate Information Change Request - J.W. (John) Matthews

The proposal to add "Directed Flow" to the nameplate is on hold pending completion of definitional efforts by the Loading Guides Work Group.

3. Routine Resistance Test - C.J. (Chuck) McMillen

This matter has been taken under advisement by the Working Group on Loss Tolerance and Measurement (as mentioned in V5 above).

VII. OLD BUSINESS

There was no old business.

VIII. NEW BUSINESS

T.P. (Tom) Traub agreed to Chair a new Task Force on LTC Performance Requirements. (See III 4d above). Initial efforts will include scope definition, review of IEC standards and possible development of a PAR. Several PCS members volunteered to participate on this Task Force which will be tentatively scheduled to meet on Monday at 3:05 at the Fall meeting.

IX. NEXT MEETING

The next meeting will be held on Tuesday, November 8, 1988 in Long Beach, Ca. The meeting was adjourned at 12:15 PM.

John D. Borst
PCS Chairman

972:lw

Subcommittee: Performance Characteristics
Subcommittee Chairman: John D. Borst (314/634-2111)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COMM. | AS OF/STATUS | PRS COORD. |
|---|---|---|---|---|---|---|
| P638 | None | L. R. Stensland | Qualification of Class 1E Transformers for Nuclear Power Generating Stations | Yes | 11/3/87 - Coordination with SC-2 leading to D16 | NPE SUB |
| | PC57.18.10 | C. G. Pounds | Practices and Requirements for Semiconductor Power Rectifier Transformers | Yes (6/81) | 11/3/87 - D/6 discussion | None |
| P786 | PC57.117 | H. F. Light | Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems. | Yes (2/79) | 12/8/87 - To be published early 1988 | T&D NPEC PO |
| | PC57.21 | J. W. McGill | Requirements, Terminology, and Test Code for Shunt Reactors Over 500 kVA | No | 11/3/87 - D/5A WG ballot results discussed. 3/14/88 - P.R request to NesCom | EM |
| P785 | PC57.116 | B. K. Patel | Guide for Transformers Directly Connected to Generators | Yes (2/79) | 11/3/87 - D/10 reviewed. | PO PSR EM NPE |
| P262 E3 | PC57.12.90 e3 | W. R. Henning | C57.12.90e3 - Revision of C57.12.90 Section 8 - "No Load Losses and Exciting Current" | No | 11/3/87 - Small changes. Now ready to be balloted. | ? |

ATTACHMENT PCS-A4
4/88-D
P 11

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Subcommittee: Performance Characteristics (PC)
Subcommittee Chairman: John D. Borst (314/634-2111)

| IEEE NO. | ANSI NO. | WG/TF CHAIRMAN | IDENTIFICATION | PAR ON FILE TRANS. COORD. | AS OF/STATUS | PES COORD. |
|---|---|---|---|---|---|---|
| P262 E2 | PC57.12.90 | W. R. Henning | Revision of C57.12.90 Section 8.3.3 | No | 4/2/87 - D/8 approved by TC 1985. Text held pending C57.1290a3 project. | ? |
| P262 E1 | PC57.12.90 e1 | W. R. Henning | Addition to C57.12.90 Section 8 | No | 4/2/87 - D/4 text being held pending C57.12.90e3 project. | ? |
| P262 E | PC57.12.90a | W. R. Henning | Revision of C57.12.90 Section 9 - Load Loss and Impedance Tests | No | 11/3/87 - Draft discussed by WG. | ? |
| P1098 | PC57.123 | W. R. Henning | *Guide for Transformer Loss Measurement* | Yes (3/85) | 4/2/87 - Work awaiting conclusion of C57.12.90a | PSIM |
| P462C | PC57.12.00 | W. R. Henning | Supplement for Allowable Loss Tolerances and Methods of Loss Measurements | No | 11/3/87 - Proposal pending for round-robin test. | ? |
| | PC57.125 | D. J. Cash | *Guide for Failure Investigation, Documentation and Analysis for Power Transformers and Shunt Reactors* | Yes (2/87) | 11/3/87 - D/5 WG ballot discussed. | T&D PCB PSE SMDB |
| | | R. H. Frazer | TF - LTC Position Indication | No | 11/3/87 - New project coordinator | |
| | | J. W. Matthews | TF - Nameplate Information "Directed Flow" | No | 11/3/87 - Awaiting input from Loading Guide WG. | |
| | | C. J. McMillen | TF - Routine Resistance Test C57.12.00K, Table 14 | No | 11/3/87 - Review results of ballot | |

ATTACHMENT PES-A2
4/88 - D
P12

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4188/D
P 13
ATTACHMENT PCS-B1

# COMMITTEE CORRESPONDENCE

**ORGANIZATION:** IEEE

**COMMITTEE:** Transformers

**SUBJECT:** Load Tap Changers

**Address Writer Care of:**
Commonwealth Edison
Post Office Box 767
Chicago, Illinois 60690

**TO:** Mr. J.D. Borst
Westinghouse Electric Corp.
P.O. Box 883
Jefferson City, MO 65102

**DATE:** 1/20/88

Dear Mr. Borst:

I propose to the Performance Characteristics Subcommittee that it undertake as one of its activities the inclusion of electrical requirements for load tap changers in the transformer standards. As is well known, the existing standards concerning load tap changers cover essentially mechanical and physical requirements. What is required is for the standards to address such considerations as the following:

- Temperature range of operation
- Rated current and associated temperature rise of current carrying parts
- Rated step voltage
- Rated insulation level
- Switching capability

Following the development of standards, or perhaps in parallel with them, a test code would also need to be developed.

At Commonwealth Edison, we have learned by experience that there can be significant differences between "X" ampere rated load tap changers made by different manufacturers. This applies not only to switching capability, but also to the other factors indicated above. Unless the load tap changer complies with IEC standards, its rating is whatever the manufacturer says it is. Test data to confirm the rating may or may not be available. The absence of electrical requirements for load tap changers is a gap in the transformer standards that badly needs to be filled.

Very truly yours,

T.P. Traub
Member, IEEE
Transformers Committee

TPT/ls

cc: O.R. Compton

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P14 of 14
~~ATTACHMENT PCS-82~~

IEEE

# TRANSFORMERS COMMITTEE

POWER ENGINEERING SOCIETY

Please Reply To:



February 5, 1988

Mr. T.P. Traub
Commonwealth Edison
Post Office Box 767
Chicago, IL 60690

Dear Mr. Traub,

Regarding your letter dated 1/20/88 concerning the development of electrical requirement standards for load tap changers, the following actions will be undertaken:

1) Administration Subcommittee review for appropriateness of the topic and its assignment to the PCS (4/11/88).
2) Formation of a PCS Working Group (4/12/88)
3) Submittal of a Project Authorization Request (PAR).

Because of your experience and expressed interest, I would like you to consider chairing the subject Working Group. Also, I am attaching a PAR form for any thoughts you may have.

Thank you for bringing this subject to the Committee's attention.

Gratefully,

John D. Borst
Chairman
Performance Characteristics Subcommittee

cc: O.R. Compton
J.H. Harlow

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p1 of 3

EPRI

Electric Power
Research Institute

# Memorandum

April 22, 1988

To: Mr. J.J. Bergeron
Secretary, IEEE Transformer Committee
Louisiana Power & Light Co.
P.O. Box 60340
1010 Common Street
New Orleans, LA 70160

From: Stan Lindgren, Project Manager SRL

Subject: **EPRI LIAISON REPORT** - Revised

The following is a revised report for inclusion in your minutes for the April 13, 1988 meeting.

1. EHV Converter Transformer

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

2. Amorphous Steel for Distribution Transformers

   - GE reports they have shipped "many thousands" of commercial amorphous core transformers.

3. Amorphous Steel for Power Transformers

   - Improved flatness, edges, and greater width have been accomplished.
   - No problems have been reported with 500 KVa unit installed and placed in service June 1987.

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P2

4. Advanced Power Transformer

- Reduced load loss feasibility has been demonstrated.
- Detailed analytical studies are in process exploring individual design aspects.

5. Static Electrification in Power Transformers

- Suspected failure mechanism in over 12 core form and shell form FOA transformers worldwide.
- 4 basic physical mechanisms and more than 10 variable parameters have been identified.
- Work is now focused on monitoring instruments and quantification of parameters for mathematical models.

6. Bubble Evolution in Overloaded Transformers

- Very rapid load changes can cause bubble formulation under some conditions and reduce 60 Hz and impulse dielectric strength. Demonstrated in models with rapid/high O.L.
- GE report is published. Westinghouse report is in final draft stage and expected to be published soon.
- Workshop was held December 8th & 9th, 1987 to discuss the reports.

7. Power Transformer with Two-Phase Cooling

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

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8. Active Transformer Noise Cancellation System

- 2-year project started March, 1987.
- Noise reduction in one direction is being pursued first.
- Expect to demonstrate on a transformer in 1988.

9. Feasibility for Improved LTC

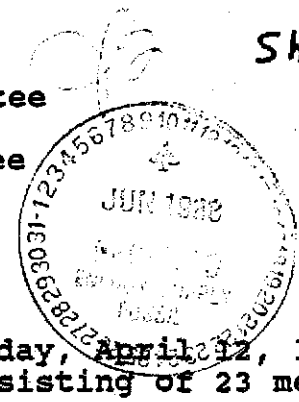
- One project focused on conventional electromechanical and ways to minimize maintenance and transformer failure. Vibration signature analysis to identify maintenance need was explored.
- One project focuses on feasibility of total solid state LTC and static phase shifters. An intertie simulation with fast response phase shifter was included.
- Final reports are in process for both projects.

SRL:sf:BERGERON

cc: Stig Nilsson
Olin Compton

ATTACH. 4/88-F
Sh. 1 of 5

Meeting Minutes
Insulation Life Subcommittee
of the
IEEE Transformer Committee
Park Terrace Hotel
Washington, D.C.
April 12, 1988



The Insulation Life Subcommittee met on Tuesday, April 12, 1988, at 1:45 p.m. A total of 65 were present consisting of 23 members and 42 guests.

After introductions were made, the minutes of the previous meeting in New Orleans on November 3, 1987, were approved as issued.

It was announced that J. L. Harbell of Westinghouse, Canada, had resigned from the Subcommittee.

As requested at the Administration Subcommittee Meeting, the scope of the Insulation Life Subcommittee was read and it was indicated that any changes to the scope will be accepted at this time.

Transformer Committee Liaison people who have not submitted a report and have not been contacted were requested to make themselves known to Olin Compton, the Committee Chairman.

The proposed Funds Solicitation Program was quickly reviewed in preparation for a discussion and consensus of the Transformer Committee members at the main committee meeting.

<u>The first working group report was given by Bill Wrenn, Chairman of the Working Group on Guides for Loading</u>.

The Working Group met at 8:00 a.m. in the Terrace West Room with <u>25</u> members and <u>22</u> guests present.

Minutes of the New Orleans meeting were approved with on change -- Jacques Aubin is still a member of the Working Group.

<u>Report on IEC 354 the Transformer Loading Guide</u>

Jacques Aubin reported that the latest revision of IEC 354 has been approved for publication and will be published in about one year. The revision was approved by 19 countries with 2 countries voting against publication -- France and Germany. Germany felt that the emergency hottest spot limiting temperature should 140°C, not 160°C. France opposed publication because it was not demonstrated that thermally upgraded paper can operate at 110°C. The U.S. did not cast a ballot. The Canadian ballot was accepted even though it was returned late.

Jacques Aubin also reported that his CIGRE Working Group will review final drafts of three Working Group documents in the upcoming August meeting.

1. Hot spot measuring devices
2. Heat run test procedures
3. Maximum hot spot temperatures

Report on status of C57.95 Loading Guide for Regulators

The Chairman reported that C57.95 has been published in proper IEEE format and is included in the latest publication of C57.

Task Force Reports on C57.91, the new loading guide, C57.92 and C57.115 Revisions:

Section III - General

John Matthews presented Draft 2 of Section III of the proposed loading guide revision at the meeting. This draft included symbol usage in accordance with current IEEE proposed standard symbolizing.

The Working Group voted to delete reference to 55°C rise transformers in the title of this document. Consideration of 55°C rise transformer loading will be included only in the appendix of the proposed loading guide revision.

Section IV - Loading of Distribution Transformers

Dave Takach indicated that Draft 2 of Section IV has been completed and had been forwarded to the Chairman. Draft 2 of Section IV reflects editorial changes made to Draft 1.

Section IV - Loading Power Transformers

Jerry Grimes led discussions on several aspects of transformer loading. Most discussion centered on the issue of whether or not the Working Group should adopt the IEC practice of using bottom oil temperature as opposed to using top oil temperature as a basis for calculating the hottest spot temperature which is current U.S. practice. Some members of the Working Group felt that hottest spot winding temperature tracked better with bottom oil temperature than with top oil temperature. A motion put forth by Dave Douglas to use the IEC method of utilizing bottom oil temperature in the hottest spot winding temperature calculation in the proposed revision of the loading guides was defeated. However, the consensus of the Working Group was that the IEC method should be explored and that data be gathered to assess the validity of the IEC method.

Other topics discussed dealt with the stray flux and resistance correction factors, low temperature loadability and auxiliary equipment restrictions on small transformer loadability.

Appendices

Dan Perco indicated that his task force met Sunday, 4:30 p.m., and discussed Appendix F - Cold Load Pickup. Dan also indicated that drafts of all the appendices will be submitted to the Working Group before the next meeting of the Working Group. The appendices include:

A. Thermal Evolution of Gas
B. Auxiliary Component Load Above Nameplate
C. Calculations for Determining Rating and Transformer Size
D. Philosophy for Older 55°C Rise Limits
E. Temperature and Altitude Consideration
F. Cold Load Pickup

It was also indicated that Bill McNutt's work on stray flux heating would be incorporated in the appendices.

Old Business

John Matthews will ballot the Working Group on the definition of "Directed Flow" transformers.

New Business

Dana L. Basel was introduced as the new Working Group Secretary. Four new members were accepted into the Working Group.

Charles R. Murray
Devki N. Sharma
James Templeton
Henry Windisch

The second Working Group report was given by Bob Grubb, Chairman of the Working Group on Thermal Tests.

The Working Group met on April 11, 1988, at 3:05 p.m., with 13 members and 10 guests in attendance.

The meeting started with introductions and approval of the minutes of the previous meeting. Chairman, Bob Grubb, indicated that in order to save time he had prepared Draft 10 of Project P838, Recommended Procedures for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Ratings, and had included the Tutorial Appendix, instead of balloting the Appendix separately. The combined document is now ready and will be sent out for balloting to the Working Group and the Subcommittee for return prior to the next meeting. Copies of Draft 10 were distributed at the meeting.

Rather than spend the time of this meeting reviewing Draft 10, the Chairman brought up a question raised earlier in the day at the meeting of the Working Group on Guides for Loading. The question relates to the IEC Loading Guide (Publication 354) practice of using bottom oil temperature as a reference for calculating hot spot temperature, rather than top oil as used in

our guides. Copies of a section of Draft 6 of IEC 354 were distributed to form the basis of discussion on whether the IEC method, or some variation, should be considered for use in our document. Several points were brought up in the discussion. Among them are:

1. The IEC method for forced oil flow transformers measures bottom oil, determines average oil from cool down curve and defines the top oil temperature by doubling the difference between bottom and average oil. This avoids the inaccuracy of measuring a temperature in the bulk top oil and assuming it relates closely to the temperature in the top oil ducts. Top oil measurement is used as a reference for non-forced oil flow transformers.

2. The IEEE Loading Guides do not address the question of difficulty in measuring or determining a meaningful top oil temperature.

3. Perhaps because of questions regarding accuracy of calculating hot spot based on either top oil or bottom oil temperature, new consideration should be given to actual hot spot measurement.

The discussion was concluded with a request for volunteers for a new task force with the primary focus of reviewing the IEC Loading Guide and determining its impact on the present ANSI Test Codes and on the P838 Recommended Overload Test Procedure. Jacques Aubin, Ed Norton, Sam Oklu, Dan Perco, Van Quan Pham and Lin Pierce volunteered.

Under new business, George McGrae presented an observation of B.C. Hydro's experience after a G.S.U. transformer failure. Temperature rise testing on the repaired transformer using a direct reading temperature device in LV leads adjacent to the windings showed temperatures significantly higher than the traditional winding temperature simulation indicators. George suggested that this experience puts added emphasis on the necessity for direct measurement of winding temperature.

There being no other new business, the meeting was adjourned at 4:20 p.m.

<u>The third Working Group report was given by Al Wurdack, Chairman of the Working Group on Thermal Evaluation of Power and Distribution Transformers</u>.

The Working Group met on Tuesday morning, April 12, 1988, at 8:00 a.m., with a total of 31 in attendance including 8 members and 23 guests.

The minutes of the New Orleans meeting were approved as corrected.

A new draft of the major revisions to C57.100, Standard Test Procedure for Thermal Evaluation of Oil Immersed Power and

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P5035

Distribution Transformers, based on discussions at the last meeting had been prepared by Dave Truax and was passed out at the meeting.

A new forward to the C57.100 guide was prepared by Lin Pierce and discussed. The forward was accepted by the Working Group.

The main discussion at the meeting centered around a draft proposal presented by Dean Yanucci on the design and construction of subassembly models that represent both shell and core form large power transformers.

It was decided that this document should be included in the Appendix of the C57.100 guide.

Lin Pierce indicated that the guide should also discuss construction of test model for transformers with major design advancements, such as high temperature insulation and new winding designs. Bill McNutt had several recommendations based on the G.E. model tests done under EPRI.

Dean Yanucci agreed to incorporate the above recommendations into his document for the next meeting.

With no further business this meeting was adjourned at 9:00 a.m.

Under new business, Steve Moore of ABB Electric asked for clarification of the section in ANSI C57.1200 covering the definition of a "Thermal Duplicate" in reference to the need for a transformer manufacturer to perform a heat run design test. This question resulted in a very spirited discussion. There is presently little definition for a "Thermal Duplicate" in existing standards. The Subcommittee Chairman will review this request and report at the next meeting.

As a final item of discussion under New Business a set of Proposed Standard Symbols was presented to the Subcommittee for comments. There was a consensus of support for these symbols and they will be presented for consideration of the main transformer committee.

There being no further business, the meeting was adjourned at 2:50 p.m. with an invitation to attend the symposium entitled Bubble Evolution - An Update sponsored by the Insulation Life Subcommittee.

Respectfully submitted,

David H. Douglas

D. H. Douglas
Subcommittee Chairman

DHD:lms

ATTACH. 4/88 - G
p1 of 1

INSULATING FLUIDS SUBCOMMITTEE
April 11-12, 1988
Washington, D.C.

The subcommittee met at 8:00 a.m. on April 11-12, 1988 with 22 members and 3 guests present.

1. It was reported that Project P-954: Guide for Hi-Temp Hydrocarbon was approved by the Standards Board and should be printed soon.

2. The problems with the PAR for Project C57.111: Guide for Silicone Liquids have been resolved and coordination comments have been received and will be reviewed.

3. Project C57.104 - Draft 5 of the Interpretation Section was reviewed. Considerable editorial and substantive additions and changes were made. A draft of the entire guide will be prepared and balloted by the subcommittee prior to the November 1988 meeting in Long Beach, CA.

4. With the Survey completed, work was begun on the review of Project C57.106. F. W. Heinrichs is chairing the working group. Assignments were made for reviewing and preparing revisions of the sections as required. A time-table was establihsed for presenting Draft 1 to the Subcommittee at the Long Beach, CA meeting in November '88.

H. A. Pearce, Chairman

F. W. Heinrichs, Secretary

4/12/88

ATTACH.
4/88-#H
p1 of 2

Westinghouse
Electric Corporation

Low Voltage Instrument
Transformer Department

Box 687
Pinetops, North Carolina 27864
(919) 827-2121

# IEEE INSTRUMENT TRANSFORMER SUBCOMMITTEE
# MINUTES FOR APRIL 12, 1988
# WASHINGTON, D. C.

1. CHAIRMAN JOHN DAVIS OPENED THE MEETING AT 10:45 AM. EIGHT MEMBERS AND FOURTEEN GUESTS ATTENDED THE MEETING.

2. THE MINUTES OF THE NOVEMBER 3, 1987, MEETING WERE APPROVED.

3. THE DRAFT 6 OF THE C57.13 REVISION WILL BE TYPED AND SUBMITTED TO THE SUBCOMMITTEE BY BALLOT.

4. THE CHAIRMAN WILL ASK THE TRANSFORMER COMMITTEE TO FORM A TASK FORCE TO STUDY AND RECOMMEND TEST METHODS FOR THE HV CURRENT TRANSFORMERS.

5. A DRAFT OF THE GUIDE FOR PARTIAL DISCHARGE TESTING WILL BE ISSUED BY MR. TONY JONNATTI AT THE NEXT MEETING.

6. THE CHAIRMAN WILL SEPARATE THE GUIDE FOR RIV TESTING, FUSING, AND CARE AND OPERATION OF INSTRUMENT TRANSFORMERS INTO THREE PARTS AND SUBMIT THESE PARTS TO THE SUBCOMMITTEE MEMBERS FOR COMMENTS.

7. MR. CHARLIE HONEY AND MR. HAROLD MOORE PRESENTED THE HIGH VOLTAGE CURRENT TRANSFORMER TEST REQUIREMENT RECOMMENDATIONS OF THE DIELECTRICS SUBCOMMITTEE. MR. MOORE WILL SUBMIT REVISIONS OF TABLES 2 AND 3 OF C57.13 AND THE CHAIRMAN WILL INCLUDE THEM WITH DRAFT 6 FOR BALLOTING.

8. THE CHAIRMAN WILL REQUEST A PROJECT NUMBER FOR THE CONFORMANCE TEST PROCEDURES, C57.13.2 AND SUBMIT THE PROCEDURES TO THE SUBCOMMITTEE BY BALLOT.

9. THE NEXT MEETINGS WILL BE HELD IN:

| | |
|---|---|
| LONG BEACH, CA. | NOV. 6-9,1988 |
| CHICAGO, ILL. | APRIL 2-5, 1989 |
| CHARLOTTE, N. C. | FALL, 1989 |
| DENVER, COL. | MARCH 25-28, 1990 |
| MONTREAL, CANADA | OCT. 21-24, 1990 |

10. THE CHAIRMAN READ A LETTER FROM IEEE ASKING IF THE SUBCOMMITTEE AGREED TO IEEE RECEIVING FUNDS FROM CORPORATION TO HELP PAY FOR LOSSES GENERATED BY PUBLISHING STANDARDS. THE SUBCOMMITTEE AGREED THAT IEEE SHOULD SOLICIT FUNDS FROM CORPORATIONS AND RAISE FEES FOR STANDARDS.

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Westinghouse Electric Corporation
Low Voltage Instrument Transformer Department
Box 687
Pinetops, North Carolina 27864
(919) 827-2121

11. MR. RAFF ASKED WHO THE LIASON BETWEEN THE IEEE AND IEC WAS. THE CHAIRMAN AGREED TO ASK THE TRANSFORMER COMMITTEE IF THERE WAS A LIASON BETWEEN THE TWO STANDARDS.

12. THE CHAIRMAN WILL SEND A MAILING LIST OF THE MEMBERS TO EACH MEMBER OF THE SUBCOMMITTEE.

13. THE MOTION TO ADJOURN WAS MADE BY MR. MAGILL, WAS SECONDED AND CARRIED. CHAIRMAN DAVIS ADJOURNED THE MEETING AT 2:47 PM.

RESPECTIVELY SUBMITTED,

W. E. Morehart

W. E. MOREHART, SECRETARY

PREPARED BY JAMES E. SMITH

MEMBERS PRESENT

J.N. DAVIS
E. SO
R.A. MAGILL
J.D. RAMBOZ
V. RAFF
K. TITO MASSOUDA
C.W. TENHAAGEN
A. JONNATTI

GUESTS

J.E. SMITH
G. ZOURIS
D. GERLACH
M.S. ALTMAN
S. LINDGREN
R. GRUMERT
DE TIEGE
O. MARGREVE
L. GRISAY
G. McCRAE
R.E MIMKOITZ SR.
H. MOORE
C.C. HONEY

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MEETING MINUTES

DRY-TYPE TRANSFORMER SUBCOMMITTEE
Washington, D.C.
April 12, 1988

Chairman: R. E. Uptegraff, Jr.

1. Introductions/Attendance/Approval of Minutes

The Dry-Type Transformer Subcommittee met at 1:50 PM on 04/12/88. There were 15 members and 12 guests present. Following the introductions of those present the minutes of the 11/03/87 meeting (New Orleans, LA) were approved as written.

1.1 Following the introductions of those present, the status reports from the various working groups and task forces were presented by their respective chairman or their chairman's alternate. See sections 2. to 8. below for details.

1.2 The status of the Through Fault Current Duration Guide was discussed by the chairman. It is being held until further action is taken on the Loading Guide.

1.3 It was announced that there has been a procedural change with respect to the 'effective date ' of a standard. It will now be the date of publication as opposed to the date it was approved.

It was also noted that it is acceptable to reference a standard that is beyond its reaffirmation date provided the standard can still be purchased.

1.4 The chairman announced that the members may wish to attend the Symposium on Bubble Evolution, although this is not considered a condition likely to occur with dry-type transformers and reactors.

1.5 Mr. F. Huber of IEEE was introduced and it was announced that there is a new Standards Manual available for use by the working group chairmen.

Protocols involving response to questions of interpretation of standards were discussed. Reference was made to Section 6 of the Standards Manual. Mr. Olin Compton, Chairman of the Transformers Committee, suggested not to offer any option and forward all such requests to the IEEE Standards Board. If requested by letter, forward the letter to the Board.

1.6 Mr. Huber was also questioned with regard to IEEE's position on the use of 'K' to represent degrees rise in Celsius. He stated that IEEE is keeping the current convention '°C' at this time.

1.7 It was noted that there is a conflict with the standard operating conditions as currently written in C57.12.00 and C57.12.01. in reference to being capable of (1) a 5 % overload with constant kVA output and (2) 110% input voltage at no load. The problem arises when one considers voltage regulation at various power factors and transformer impedances. The chairman stated that this is a problem for the Performance Characteristics Subcommittee and would bring it to their attention.

1.8 The chairman announced that Dr. Kinsbury of Penn State Uni. is seeking individuals interested in sound problems associated with dry-type transformers.

1.9 The meeting was adjourned at 3:30 PM.

REPORTS FROM WORKING GROUPS and TASK FORCES

2. Insulation Requirements for Specialty Transformers - P259 (WG)
IEEE Std 259-1974 (P259)

Chairman: A. Iverson

2.1 The working group met at 8:00 AM on 04/11/88 with 6 members and 1 guest present. Following the introductions of those present, the minutes of the 11/02/87 meeting were approved as written.

2.2 Dave Barnard and Jack Rodden became new members of the WG.

2.3 Draft #3 of P259 was distributed. A number of improvements were proposed and discussed regarding the definition of working voltage, use of a condensation chamber, use of data for comparative purposes only, and maximum extrapolation of data.

Dave Barnard proposed relevant standards for listing in the document.

2.4 The Spring Meeting of PCPCI (Power Conversion Products Council International) to be held in St. Louis will include a panel discussion featuring a summary review of IEEE 259, IEEE 266, and UL 1446. The possibilities for coordination of the three standards will be discussed .

2.5 The meeting was adjourned at 9:55 AM.

3. General Requirements for Dry-Type Transformers Including Those With Solid Cast and/or Resin Encapsulated Windings - C57.12.01 (WG)

Chairman: Egon Koenig

3.1 The working group met at 10:05 AM on 04/11/88 with 22 members and 6 guests present. Following the introductions of those present, the minutes of the 11/02/87 meeting were approved as written.

3.2 The chairman reported that Draft #5 of C57.12.01 had been balloted in the Transformers Committee. A meeting held Sunday, 04/10/88, to resolve the 3 negative ballots received.

Negative Ballot #1:

This negative ballot was removed after it was aggreed that a product standard needs to be written to address the details of the cast coil transformers.

Negative Ballot #2:

This negative ballot was withdrawn after discussing the pros and cons of having separate dielectric values for cast and non-cast transformers. It was decided that Table 3 in Draft #5 was sufficient to cover all dry-type transformers covered by C57.12.01.

Negative Ballot #3:

This negative ballot concerned the temperature values for insulation system temperatures listed in Table 4A of Draft #5. After much discussion this negative ballot was withdrawn and Table 4A was left unchanged.

3.3 Various editiorial changes to Table 4A were then discussed with agreement reached on the following:

Add a reference to para. 4.1.2.1 to the first footnote to Table 4A. The other footnotes will not be changed.

Change the heading of Table 4A to read: "Limits of Temperature and Temperature Rise for Continuously Rated Dry-Type Transformer Windings".

Remove the word 'maximum' from the second column so that its heading will now read: "Average Winding Temperature Rise by Resistance".

3.4 Having resolved all negative ballots, it was agreed that since the only changes made since last balloting by the Transformers Committee were to Table 4A, p.16, this page would be resubmitted to the Transformers Committee for re-balloting.

3.5 Bill Mutschler advised the working group that a decision has been made against the use of 'K' to designate degree Celsius temperature rise (the IEC convention). Messrs. Mutschler and Gearhart agreed to review the entire Draft #5 of PC57.12.01 and mark all occurances of the use of 'K' and note any inconsistencies associated with its replacement. This review is to be completed by 05/05/88.

The chairman will prepare Draft #6 of PC57.12.01 to incorporate all necessary editorial changes and send it out for balloting by agencies other than the Transformers Committee.

3.6 Mr. Windish suggested that para. 5.9 be modified to remove the adjective 'standard' from the last sentence. It will now read: "See Table 4A for average temperature rise values".

3.7 Mr. Uptegraff moved and Mr. Mutschler seconded that Draft #6 comply with the Proposed Standard for Thermal Symbols dated 03/88 and authored by D. H. Douglas. The motion was voted upon and approved.

3.8 Other Business:

The chairman read a letter from Mr. Jerry Frank dated 03/25/88. Two of the four points raised in the letter are covered by Draft #5. The other two points are not appropriate for this standard and will not be addressed. The chairman provided a written response to that affect.

Mr. R. Gearhart asked when the working group would begin to address C57.12.91 now that it appears the work on C57.12.01 is complete. The chairman pointed out that earlier work on C57.12.91 was deferred until C57.12.01 could be completed. Before the next meeting the chairman will mail each member a copy of C57.12.91 for review with changes that have been suggested.

3.9 The meeting was adjourned at 11:15 AM.

4. Working Group on Dry-Type Thermal Problems - C57.96 (WG)

Chairman: Bill Mutschler

4.1 The working group met at 3:00 PM on 04/11/88 with 18 members and 9 guests present. Following the introductions of those present, the minutes of the 11/02/87 meeting were approved as written.

4.2 The chairman reported that Draft #10.3, dated 02/22/87, of C57.96 is in the hands of the Standards Board for processing as an offical IEEE document. The chairman reported that this draft contains the symbol 'K' for temperature rise which will be changed to '°C' before publication.

4.3 Discussions followed on thermal concerns which have surfaced since the guides completion. These are:

1. Insulation Systems - 150°C, 185°C, 220°C, etc.
2. Temperature Rises
3. Hot Spot Allowance/Differentials
4. Thermal Time Constants

In order to evaluate the need to rationalize any differences that may exist on items (1) and (2) the chairman requested Mr. Gearhart to survey existing documents (domestic and foreign) on dry-type products and to list existing values.

After considerable discussion on items (3) and (4) it was the consenus that a questionnaire be prepared by the chairman to obtain data for minimum and maximum values for hot spot allowance and thermal time constants on the following groupings:

| Type: | Vent | Size: | | Rise: |
|---|---|---|---|---|
| | Sealed | 500 < kva <= 2500 | | 115°C |
| | Cast | 2500 < kva <= 10000 | | 150°C |

Data is to be collected and sent to Mr. Egon Koenig for tabulation and dissemination.

4.4 The meeting was adjourned at 5:00 PM.

5. Working Group on Dielectric Problems - C57.12.58 & C57.124 (WG)

Chairman: A. D. Kline

5.1 The working group met at 8:00 AM on 04/12/88 with 17 members and 8 guests present. Following the introductions of those present, the minutes of the 11/03/87 meeting were approved as written.

5.2 Draft #7 of C57.12.58 (Proposed Practice to Conduct a Transient Analysis) was reviewed as to its status. Coordination with IAS and IEC is incomplete. Mr. Uptegraff will inquire of the Standards Board as to the necessity for such coordination.

5.3 Draft #4 of C57.124 (Proposed Recommended Practice for the Detection of Partial Discharge) was discussed. Numerous improvements were suggested.

A vote was taken to ballot all members present approving the comments on Draft #4. The purpose was to expedite adoption of the comments for Draft #5.

Draft #5 will be balloted in the working group and the Dry-Type Transformer Subcommittee to prepare the proposal for voting by the Transformers Committee at the next meeting in Long Beach, Calif.

5.4 The meeting was adjourned at 9:45 AM.

6. Standard Test Procedures for Thermal Evaluation of Insulation Systems for Soild Cast and Resin Encapsulated Power and Distribution Transformers - C57.12.60 (WG)

Chairman: George Bowers

6.1 The working group met at 11:15 AM on 04/12/88 with 11 members and 14 guests present. Following the introductions of those present, the outcome of the ballots in the Dry-Type Transformer Subcommittee and the Transformers Committee were reviewed.

6.2 The results of the ballot in the Dry-Type Transformer Subcommittee were:

| | | |
|---|---|---|
| Ballots Sent Out: | 26 | |
| Ballots Returned: | 22 | --- 85% returned |
| Affirmative: | 18 | |
| Affirmative w/ Comment: | 2 | |
| Negative: | 1 | --- 95% voted |
| Not Voting: | 1 | |

See 6.4 for discussion of the comments and 6.5 for discussion on the negative vote.

6.3 The results of the ballot in the Transformers Committee were:

| | | |
|---|---|---|
| Ballots Sent Out: | 117 | |
| Non-Member Returns: | 6 | |
| Active Ballots: | 111 | |
| Ballots Returned: | 92 | --- 83% returned |
| Affirmative: | 67 | |
| Affirmative w/ Comment: | 5 | |
| Negative: | 2 | --- 80% voted |
| Not Voting: | 18 | |

See 6.4 for discussion of the comments and 6.5 for discussion on the negative votes.

6.4 The comments were discussed and considered editorial in nature and, where applicable, incorporated into the document.

6.5 Negative Ballot #1:

This negative vote was on symbology and indicated we should comply with the current attempts at standardization. It was pointed out that this document was to parallel C57.12.58 (Thermal Evaluation of Ventilated Dry-Type Insulation Systems) and that changes in symbology between the two documents would tend to create confusion. It was further explained that the goal was to combine the two documents as soon as possible and that would be the best time to incorporate the latest symbology. The negative vote was withdrawn.

Negative Ballot #2:

This negative vote concerned the title of the document. The cover letter indicated that the document was being put out for trial use but this was not shown on the title page. It was agreed that a letter would be sent out to all who reviewed the ballot explaining the situation and asking if they object to the addition of "trial use" to the document.

In the meantime, the editorial changes would be incorporated and contacts initiated with the necessary liason groups.

6.6 The meeting was adjourned and the members present continued as an ad hoc working group on flammability issues. See section 7. below.

7. Flammability (WG)

Chairman: George Bowers

7.1 This working group is an extension of the Working Group on Standard Test Procedures for Thermal Evaluation of Insulation Systems for Solid Cast and Resin Encapsulated Power and Distribution Transformers which met at 11:15 AM on 04/12/88 with 11 members and 14 guests present.

7.2 A discussion ensued concerning the merits and/or existence of the group.

The chairman stated the purpose of the ad hoc group is to act as an educational group and collect data needed to develop transformer flammability criteria as applicable to the industry when and if needed.

It was pointed out that the expertise on this topic was at UL, Factory Mutual, NFPA, etc., and not at IEEE. It was further pointed out that there is no common agreement among the experts but they are starting work towards such an agreement.

The chairman noted that over the current period the group had been inactive and asked if the need for it still existed. The consensus was decidedly in the affirmative and will therefore be continued. The chairman indicated he would be able to get a report next meeting on the IEC Advisory Committee on safety currently being held at UL, Northbrook. Mr. Jerry Frank agreed to gather additional background information to forward to the group.

7.3 The meeting was adjourned at 12:15 PM.

8. Dry-Type Reactor Task Force (TF)

Chairman: Richard Dudley

Ref: C57.21 - "Requirements for Shunt Reactors"

8.1 The task force met at 8:00 AM on 04/11/88 with 6 members present. Following the introductions of those present, the minutes of the 11/02/87 meeting were approved as written. However, it was noted that the temperature rise limits in Table #3 of Draft #6 (C57.21) were still not satisfactory.

8.2 Mr. Gerald Laguens has become a new member of the WG.

8.3 Much of the meeting consisted of an attempt to resolve the problems with Table #3. The following are the main criteria that were accepted as the basis for a new version of Table #3.

1. It was agreed that the 80°C average rise, 110°C hot spot rise, values in the existing standard must be carried over to the new standard.

2. A 180°C insulation system should be added to Table #3 to round out the natural progression of available temperature classes.

3. At least a 30°C differential between hot spot rise and average rise should be maintained.

4. The difference between "Insulation System" ("Temperature Index") and hot spot rise should increase with increasing temperature rating in an attempt to be more conservative at higher temperatures.

5. If at all possible values for average rise and hot spot rise should be recognizable as values in existing standards.

6. A note should be added below Table #3 stating that the listed temperatures are upper limits and that actual values would typically be lower based on real operating conditions.

7. The addition of 180°C "Insulation System" to Table #3 will necessitate an appropriate change to Table #2.

8.4 The following is a representation of the amended table.

TABLE #3

LIMITS OF TEMPERATURE RISE FOR CONTINUOUSLY RATED SHUNT

| Type of Shunt Reactor | Insulation System | Hottest-Spot Winding Temperature Rise Degree C | Avg. Winding Temp. Rise by Resistance Degreee C |
|---|---|---|---|
| Oil Immersed | --- | 80 | 65 |
| Dry-Type | 105 | 85 | 55 |
| | 130 | 110 | 80 |
| | 155 | 135 | 100 |
| | 180 | 155 | 125 |
| | 220 | 180 | 150 |

NOTES: 1. A shunt.....acceptance test
2. .....
3. The above average temperature rises and hot spot temperature rises are maximum upper limits. Specified temperature limits may be lower due to such service considerations as average ambient temperature conditions, indoor vs outdoor service, annual loading profile, etc.

8.5 Mr. Ray Allustiarti tabled new suggested changes. They were editorial in nature except for the following:

1. He would prefer "Vibration Tests" listed in Table #4B to be classified as a minimum as a "design" test rather than "other".

2. For dry-types an impulse test is required as "routine" for system voltages over 34.5 kV. This is not clear in Table #4B.

3. Section 12.2, p. 87, is not clear. The wording "not energized" is not appropriate to describe the state of a reactor still connected to the line but with a neutral side breaker open.

8.6 The chairman agreed to produce a revised version of Table #3 and appropriately amend Table #2. He also agreed to present all issues to Mr. Bill Kennedy's Task Force on Dielectric Testing and Mr. Jack McGill's Working Group for the Revision of C57.21.

8.7 The meeting was adjourned at 9:50 AM.

Submitted by: Wesley F. Patterson, Jr.
Secretary
Dry-Type Transformer Subcommittee
August 13, 1986

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MEETING MINUTES

DIELECTRIC TESTS SUBCOMMITTEE
April 12, 1988
Radisson Park Terrace - Washington, D.C.

1. INTRODUCTION/ATTENDANCE

The Dielectric Tests Subcommittee met at 10:07 A.M. with 38 members and 41 guests in attendance. Richard Lowe and Greydon Woolerton have been accepted as new members of the Dielectric Tests Subcommittee.

2. APPROVAL OF MINUTES

The minutes of the November 3, 1987 meeting in New Orleans, LA were approved as submitted.

3. CHAIRMAN'S COMMENTS from ADMINISTRATIVE SUBCOMMITTEE

A. The Pre-registration fee is determined by the Host. A $5.00 late registration charge has been in effect for a number of years. "Walk-ins" affect the amount of "goodies" available at the Sunday Reception and tend to increase the Pre-registration fee. Please Pre-register!

B. Dates and locations of future meetings:

| | |
|---|---|
| 11/6 - 13/88 | Long Beach, CA |
| 4/9 - 12/89 | Chicago, IL |
| Fall 1989 | Charlotte, NC |
| 3/18 - 21/90 | Denver, CO |
| Fall 1990 | Montreal, Quebec, Canada |

C. Sub Committee SCOPE

The SCOPE of the Dielectric Tests Subcommittee continues to be: "Determine test voltage requirements for service conditions, or conversely, voltage tests that will determine that service requirements are met."

D. SYMPOSIUM - "Bubble Evolution - An Update" will be held at 3:15 P.M.

E. ADCOM discussed the "Standards Funds Solicitation Program."

F. ADCOM discussed potential meeting solutions to reduce the conflicts between Task Force and Working Group meetings, predominantly on Monday.

4. WORKING GROUP REPORTS

A. Working Group on Revision of Dielectric Tests
H. R. Moore

The Working Group met on April 11, 1988 at 3:00 P.M. with 16 members and 14 guests present.

The minutes of the November 2,1987 meeting were approved as written.

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

The Task Force met at 1:00 P.M. on April 11, 1988 with 6 members and 16 guests present. The discussion centered on Draft 6 of the "Requirements, Terminology and Test Code for Shunt Reactors over 500 KVA" by Jack McGill's Working Group in the Performance Characteristics Subcommittee. This draft had been prepared with input on dielectric testing by our Task Force and with input on dry type shunt reactors by Richard Dudley's Task Force. Although it had been hoped that front of wave impulse tests could be eliminated from the Shunt Reactor Standard, it was included in Draft 6 to be consistent with the transformer standard.

Jack McGill balloted his Working Group and received many comments from the members. The comments on the dielectric test section formed the basis of discussion for the Task Force. Items covered at the meeting were as follows:

1) The wording in the applied voltage test was changed to be consistent with transformer standards where voltage is applied between the neutral and ground with all bushings connected together. The tables will be changed to show applied voltages through 1175 BIL to reflect the higher neutral insulation levels which can occur in shunt reactors.

2) It was agreed to add a sentence limiting the insulation power factor in shunt reactors to 0.5%.

3) A switching impulse level for dry type reactors at 115 kV nominal voltage was added.

4) There were a number of instances where the wording in the draft was changed to be consistent with the transformer standards.

5) The allowable RIV levels for shunt reactors were again discussed, and it was agreed that it should remain at 200 kV. (The transformer standard is 100 kV). This reflects the fact that shunt reactor testing is more difficult than transformer testing. The work completed by the working Group for Partial Discharge Measurement will be incorporated in this section of the Draft.

6) A number of changes in wording will be made in the next draft for clarification.

Draft 7 will be prepared by the Working Group for the Revision of Test Codes for Shunt Reactors. It was decided that it will be balloted in the Working Group and the Subcommittee.

## Task Force on External Phase to Phase Clearances for Power Transformers
R. A. Veitch

The Task Force met at 10 A.M.on April 11, 1988 with 4 members and 14 guests present.

The meeting was devoted to a review of the balloting of Draft 7 of the "Minimum External Clearance Between Transformer Live Parts of Different Phases of the Same Voltage." This draft had been balloted in the Working Group on Revision of Dielectric Tests and the Dielectric Tests Subcommittee with the following results:

| | |
|---|---|
| 51 | Approved |
| 5 | Approved with comment |
| 3 | Not approved. |

92.3% of the ballots were returned.

All negative ballots have been resolved, and the comments have been accepted for inclusion in Draft 8. The Task Force minutes contain the details of the negative ballot resolution and the comments that will be included in the next draft.

It was the recommendation of the Task Force Chairman, R. A. Veitch, that Draft 8 be sent to the Transformers Committee for balloting. The Working Group accepted the recommendation.

## Task Force on Revision of Impulse Test Guide
R. E. Minkwitz

The Task Force met at 10:05 A.M. on April 11, 1988 with 11 members and 4 guests present.

The task Force has been without a chairman for a time, and this meeting served as an organizational session to redefine the scope.

The following items were discussed:

1) The use of digital recorders during impulse tests was reviewed. Dennis Allen had submitted experience with digital equipment during high voltage impulse tests. The position paper by Mr. Freyhult and Mr. Mehta was also discussed. A copy of the IEC

document on digital recorders had been distributed by the Chairman. The Chairman requested that the Task Force study these documents in preparation for the November meeting.

2) The outline of Switching Surges Tests prepared by Mr. Hall was reviewed, and the Chairman requested that members send him comments by 9/15/88 in preparation for the next meeting.

3) A list of suggested items presented by Mr. Iliff was reviewed. Several of these items will be included in the investigations to be made by the Task Force.

4) A letter will be written to members of the Task Force and the Working Group on Revision of Dielectric Tests to request input on other items that should be investigated by the Task Force.

Charley Honey discussed a survey of tests and test requirements for instrument transformers that he had prepared at the request of the Instrument Transformer Subcommittee. The discussion indicated the need to study the tests performed in instrument transformers in relation to the application and protection of such transformers on the system.

There were no new business items presented.

The meeting adjourned at 4:00 P.M.

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

The Working Group met at 1:00 P.M. on April 11, 1988 in Washington, D.C. with 14 members and 16 guests present.

Following self-introduction of attendees, the minutes of the 11/2/87 meeting in New Orleans were approved as written.

Jim Sim and Jury Akers have requested membership in the Working Group.

Bill Henning led a discussion on the suitability of the proposed Routine Impulse Test for Distribution Transformers for all of the voltage ratings in C57.12.20, Table 2. The Standard includes all primary voltage ratings up to 67 kV and secondary voltages up to 7190 volts. Most distribution transformer manufacturers' experience is limited to 19.9 kV and lower voltage transformers. Jeewan Puri had reported trouble in identifying failed 34 kV transformers when they were given the impulse test.

Bill Henning explained what happens when an impulse voltage is applied to a distribution transformer and how an RC circuit is used to detect the current wave shape. The values of R and C will change with the voltage rating of the transformers and with the other parameters of the test circuit.

Rather than provide values of R and C in the Standards, Chuck McMillen stated that they could be extrapolated from tests of other voltage transformers. Chuck also reaffirmed that single turn faults can be detected in transformers up to 67 kV by impulsing the high voltage windings.

Lloyd Miller stated that impulse testing of the high voltage winding usually does not exceed the BIL of the low voltage winding with the secondary open circuited. This generally is not true if the low voltage winding is impulsed.

The Working Group conclusion was that a fault in all transformers in C57.12.20 can be successfully detected by an impulse test. Bill Henning will ballot Draft 5 simultaneously in the Working Group and Subcommittee.

## Task Force on Low Side Surge Requirements for Distribution Transformers

R. E. Lee

The newly established Task Force met for the first time at 8:00 A.M. on April 11, 1988 in Washington, D.C. with 16 members and 13 guests present.

The minutes of the November 2, 1987 Round Table Discussion were approved as submitted.

Charley Williams presented an overview of data from the teardown of 179 failed distribution transformers. Pole and pad mounted units were included. Eighty (80 %) percent were of non-interlaced design.

Copies of the "Teardown Analysis for Failed Distribution Transformers" will be sent to those in attendance.

Charley will, on request, provide a copy of the data in LOTUS 1-2-3 format for further analysis. Florida Power Corp. considers that there is considerable evidence that there is a significant problem with Low Side Surge failures of overhead and pad mounted distribution transformers. Florida Power Corp. feels that a test is required.

Jeewan Puri reviewed the magnetic theory involved in the various core and coil combinations and designs. He also described circuit theory associated with both overhead and pad mounted distribution transformers. He concludes that the relationship between transformer ground and customer ground resistance is a major element influencing transformer failures. He also concludes that lightning strokes in the magnitude of 100,000 amps are required to produce "signature failures".

General discussion followed with Charles Brown stating - there is a problem - but we need some more circuit and grounding data and then we may be able to define the problem.

We agreed that our next meeting will be devoted to grounding aspects that may contribute to the subject.

Bob Lee stated that the Darveniza/Mercer paper "Lightning Protection of Pole Mounted Transformers" was accepted for 88 SPM and will be distributed when it is printed.

We also agreed to defer discussion of Test/No Test until the next meeting.

Bruce Uhl suggested that we may need a 4 hour session in Long Beach.

M. P. Sampet presented information on voltage distribution in transformers which were subjected to low side surges.

Cal Kappeler requested clarification of the definition of "signature".

The meeting adjourned at 10:04 A.M.

Phil Hopkinson and Chuck McMillen then commented on the Florida Power Corp. data because time during the Task Force meeting had run short. Chuck also mentioned 2 DOE reports on lightning magnitude in Florida which measured the maximum discharge current through surge aresters at 68 kA.

The meeting was adjourned at 2:05 P.M.

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

The Working Group met at 8:00 A.M. on April 12, 1988 with 14 members and 16 guests present.

The first item on the agenda was membership. A membership list had been distributed and members were asked to check that the information on it was correct. Four people requested membership and were accepted in the Working Group. Membership now stands at 32.

Next item was approval of the minutes of the New Orleans meeting that had been mailed to all members. They were accepted as written.

Task Force reports were presented next.

Task Force for Acoustic Detection of Partial Discharge
E. Howells

Due to the absence of Ed Howells, the Task Force meeting on April 11, 1988 was chaired by Mr. Richard Lowe at 10:05 A.M., the Task Force Secretary.

Mr. Lowe was unable to attend the Working Group meeting and his report was read by the Chairman of the Working Group, Mr. G. H. Vaillancourt.

The Task Force met with 6 members and 10 guests present. Ed Howells had sent word that he had received PAR 57-127 on April 5, 1988 for "Trial Use Guide for the Detection of Acoustic Emissions from Partial Dis-

charges in Oil-Immersed Power Transformers". This Guide has been through 10 drafts at the Task Force level and is now ready for simultaneous balloting at the Working Group and Subcommittee levels. Permission for simultaneous balloting has already been granted by both the Working Group and the Subcommittee at the New Orleans meeting.

Chairman Ed Howells had sent, for distribution at the meeting, a draft of the Object and Introduction sections for a proposed guide for the location of partial discharge in transformers by acoustic emission. Discussion centered around instruments available for that purpose and experience gained in detection and/or location of partial discharges by acoustic means. It appeared that few people present at this meeting had experience with acoustic emission of partial discharge. It was reported that several devices are available in Europe and one or more modified devices were developed under EPRI projects in the United States.

## Task Force for Measurement of Apparent Charge
W. J. Carter

The Task Force met in Washington, D.C. on April 11, 1988 at 8:00 A.M. with 10 members and 13 guests present.

The Chairman submitted two suggested formats for the RIV-PC data collection process. These forms were discussed at great length. The discussion resulted in a draft worksheet showing the required data. A further review of the data sheet and of any data submitted will continue with the next Task Force meeting. It is our intent to begin collecting data as soon as the form has been distributed. All manufacturers and users are encouraged to submit forms early for discussion at the next Task Force meeting. The tests should be made as indicated in the Trial Use Guide C57.113 that is now available from IEEE as part of the C57 complete 1988 edition.

Mr. H. G. Fischer of EHV Weidman agreed to act as the data collecting agency. Copies of the test data should be sent directly to Mr. Fischer. Mr. George Vaillancourt will act as a consultant for interpretation of the data.

Mr. Vaillancourt requested that as the Trial Use Guide is used, comments on the application of the Guide be prepared for the next revision of the Guide.

The meeting adjourned at 10:40 A.M.

This concluded Task Force reports.

A discussion on the data sheet then took place. Members expressed concerns that they would not get the sheet soon enough. The Working Group decided that permission would be asked to distribute the data sheet as soon as possible to everyone listed on the Transformers Committee Invitation List. This should be within a month or so if permission is granted. (Permission was granted at the Subcommittee meeting).

The Chairman commented that he had noticed a lot of enthusiasm among people attending the meeting of the Task Force for Measurement of Apparent Charge. It appears that people are now ready to go into data collection and are anxious to do it.

The meeting adjourned at 8:45 A.M.

5. NEW BUSINESS

We discussed the High Voltage CT concern and noted that an informative and interesting Round Table Discussion had been held and that much of the Instrument Transformer Subcommittee meeting centered around this issue.

7. ADJOURNMENT

The meeting was adjourned at 11:11 A.M.

Robert E. Lee
Chairman

REL/rel

ATTACH. 4/88 - K
p1of1

IEEE

# TRANSFORMERS COMMITTEE

POWER ENGINEERING SOCIETY

Please Reply To:

Minutes of the HVDC Converter Transformer and Smoothing Reactor


CHAIRMAN
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Virginia Power
Grayland
P.O. Box 2666
Richmond, VA 23261

VICE CHAIRMAN
Robert A. Veitch
Ferranti - Packard Transformer
121 Industry St.
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SECRETARY
John J. Bergeron
Louisiana Power and Light
P.O. Box 60340
New Orleans, LA 70160

**SUBCOMMITTEE CHAIRMEN:**

AUDIBLE SOUND and VIBRATION
Allan M. Teplitsky
Consolidated Edison
4 Irving Place Rm. 306 S
New York, New York 10003

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One Riverside Drive
Columbus, OH 43215

HVDC CONVERTER TRANSFORMERS and REACTORS
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651 Holiday Drive
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DRY TYPE TRANSFORMERS
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WEST COAST
Dennis W. Gerlach
Salt River Project
P.O. Box 52025
Phoenix, AZ 85072-2025


The meeting was called to order at 8:05 am, with three members and eight guests present. Our initial discussion addressed the subject of a formation of a working group in the Bushing Subcommittee to address the testing of HVDC bushings for converter transformers and smoothing reactors. Three members of the HVDC Subcommittee expressed interest in participating in the new working group - one representing a transformer manufacturer and two from bushing manufacturers. Additional participation, particularly from utilities, is encouraged.

The second topic discussed was the direction for our subcommittee. When it was formed, we originally planned to prepare a guide on HVDC equipment. While such a guide would prove worthwhile from a tutorial basis, there is a very strong need for a standard covering the subject. The members of the subcommittee has already prepared a basis for the dielectric tests earlier which was published as an IEEE paper in 1985, and we achieved a consensus that it would be more worthwhile for our subcommittee to prepare a draft standard for testing the converter equipment instead of a guide. A PAR will be prepared to reflect this desire.

Our final subject concerned loss calculation and measurement in HVDC transformers. At our last meeting in New Orleans, Dr. Ram from Federal Pioneer discussed a Manitoba Hydro IEEE paper to be presented at the 1987 Winter Power meeting. This paper described their work on measuring losses on converter transformers as a function of harmonic currents. Following the meeting, Dr. Ram sent me a copy of the paper with closure, as well as technical information on the measuring equipment used to obtain the data.

Additional loss data was provided by Dr. Stein of Siemens; all of this information was distributed at the meeting. It was felt that additional transformer loss measurements are desired using different types of winding conductor, coil design, and electromagnetic shield arrangements. This data would be used to check the methods developed by Dr. Ram. If the correlation remains good the technique could be incorporated into the new standard.

Respectfully submitted,

Bill Kennedy

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

ajm:0180R

76

ATTACH. 4/88-L
p1 of 2

*BUSHING SUBCOMMITTEE*

*Report to the Transformers Committee*
*April 13, 1988*

*The Bushing Subcommittee met on Tuesday, April 12, 1988 with eleven members and four guests present.*

*The first order of business was a report of the activities of the Working Group on the Bushing Application Guide by Chairman Fred Elliott. The working group met on Tuesday monring with five members and eight guests present. Loren Wagenaar reported that he had received a letter from Paul Lange, Secretary of the IEEE Revision Committee, stating that the IEEE will not publish the P757 Loading Guide. It was approved by the IEEE Standards Board in December, 1981 and by that gage, it is past due for revision.*

*The Working Group discussed this latest development of this beleaguered guide and discussed these different options:*

1) *Incorporate the loading guide as part of the P800 guide currently being worked on by the working group.*

2) *Send the loading guide through the Transformers Committee once more for publication of an IEEE Trial Use Guide.*

3) *Recommend to the Transformers Committee that the guide be reaffirmed as an IEEE Trial Use Guide.*

*During this discussion, it was noted that four editorial corrections had been found in the document. However, no technical changes have been suggested at this time. One reason for this is that it has not been published and it has not received any useage.*

*The Working Group voted to proceed with Alternate 3 and recommended to the Bushing Subcommittee that the Transformers Committee reaffirm this guide for publication as an IEEE Trial Use Guide.*

*The Working Group also discussed components of the first draft of P800, Bushing Application Guide. This included a review of a draft of the section on application of bushings in contaminated environments prepared by Chairman Elliott. It was decided to use the contamination levels defined by IEC Publication 815 and the corresponding creepage distances specified by IEC Publication 137. Also reviewed were drafts of sections on the thermal loading for bushings applied to isolated phase bus, submitted by Prit Singh, and maintenance of bushings, submitted by Bill Saxon and Devki Sharma. The initial draft of the document will now be ballotted within the Working Group.*

*No report was received from the Task Force on Bushings for Distribution Transformers. Chairman Lloyd Miller is still looking for members of this task force.*

*The Bushing Subcommittee adopted the working groups' recommendation that the Transformers Committee be requested to reaffirm the P757-1981 document with the four editorial changes. It also directed the working group to include the P757 text in the P800 application guide.*

*The Bushing Subcommittee completed the major revisions required to resolve the numerous comments on the Transformers Committee ballot on Draft 7 of P21, General Requirements and Test Procedures for Outdoor Apparatus Bushings. The text of the section on the routine tests incorporating the test procedure developed at previous meetings was discussed. A thermal stability test will also be added as a design test for bushings rated 500kV and above. Draft 8 of P21 will be ballotted simultaneously in the Subcommittee and the Transformers Committee.*

*L.B. Wagenaar*
*Chairman*

ATTACH. 4/88-M
p1 of 2

Meeting Minutes
Audible Sound & Vibration Subcommittee
Washington, D.C. Meeting
April 12, 1988

The Subcommittee was convened by Allan Teplitzky at 10:00 A.M. on April 12, 1988. The following were present:

| Members | Guests |
|---|---|
| R. Bancroft | R. Dudley |
| J. Ebert | K. Fleming |
| R.S. Girgis | J. Frank |
| J. Hupp | J. Grimes |
| H. Jin Sim | D. Hartley |
| J.G. Lackey | R. Hayes |
| W.J. McNutt | G. Krause |
| L.M. Nicholas | C.L. Moore |
| L.W. Pierce | V.A. Pham |
| J.M. Pollitt | G. Pregent |
| A.M. Teplitzky | |

1. The minutes of the November 3, 1987 New Orleans meeting were approved.

2. The chairman reported the following results for the Subcommittee's ballot on Draft 4 of the transformer noise standard (C57.12.90 - 198X):

   Approved - 9
   Approved with comments - 4
   Negative - 3
   Not voting - 2
   Number voting: 18 of 24 Subcommittee members

   The chairman requested all Subcommittee members to return their ballot even if they do not vote.

3. The remainder of the meeting was spent resolving Subcommittee members' comments. The chairman distributed a redraft of the Draft 4 standard and a listing of the unresolved comments. The following were unanimously agreed to by the Subcommittee:

   a) a new Section 13.5.1.3, Method III, will be added to the standard that will permit the use of narrow band sound measurements for determining transformer sound emissions.

   b) Section 13.5.3.1 will be moved to preceed Section 13.5.3.

   c) Section 13.1 will be modified to include a statement about winding generated noise.

d) Section 13.3.1, the word "shall" will be changed to "should."

e) Section 13.3.2 will be modified to include a sentence, "If the specified condition cannot be met the measurement results may not be valid."

f) In Section 13.5, the term "sound level" will be changed to "sound pressure level."

4. The chairman requested that the Subcommittee members send to him by April 27, 1988 any other comments that they want to be included in Draft 5.

5. The Subcommittee will be requested to ballot on Draft 5 in May 1988.

6. The chairman requested that the Subcommittee give consideration to organizing a Working Group for preparing a "Guide for the Control of Transformer Sound" (IEEE No. P 523 & ANSI PC 57.112).

The meeting was adjourned at 11:30 A.M.

L A Swenson

Lennart A. Swenson
Secretary, Audible Sound
& Vibration Subcommittee

ATTACH. 4/88-N
p1of5

IEEE

# TRANSFORMERS COMMITTEE

POWER ENGINEERING SOCIETY

Please Reply To:

Robert A. Veitch
Ferranti-Packard Transformers
10 Carlson Court, Suite 200
Rexdale, Ontario
M9W 6L2.



June 17, 1988.

Mr. John J. Bergeron
Secretary
IEEE Transformers Committee
Louisiana Power & Light
P.O. Box 60340
New Orleans
LA 70160.

Dear John:

**SUBJECT : Minutes of Transformers Committee Meeting Held April 13, 1988 in Washington**

Attached is a copy of my "Report on Technical Paper Activities" presented to the Transformers Committee on April 13 for inclusion with your minutes.

At this meeting, Olin asked me to present my, "Review of Scope of the Transformers Committee" as outlined in my letter to him dated March 16, 1988. (I have attached an additional copy of this letter).

At the end of the presentation, the Committee voted on and accepted the following changes in its scope:

(a) Delete the following:

- Insulators and hardware with transformers
- Railway service transformers
- Test Transformers
- Constant current transformers

Contd...../2

4/88-N
P 2



(b) Modify the following:

- "Bushing and Instrument Transformers" will become, "Instrument Transformers".

- "Transformers Outdoor Apparatus Bushings" will become, "Outdoor Apparatus Bushings".

(c) We will add the following:

- HVDC Converter Transformers and Smoothing Reactors.

- Power Semiconductors Rectifier Transformers.

I will rewrite the scope of the Transformers Committee completely, in line with the above, and send it to you prior to your submission of information for the 1989 Organization and Committee Directory.

During our discussion on the scope of the Transformers Committee, we considered Furnace Transformers and On Load Tap Changers. It was agreed that this equipment would not be added at this time. It was noted that a task force had just been organized to consider on load tapchangers and the results of this study would determine if this device will be added to our scope.

Sincerely,

Robert A. Veitch
Vice-Chairman
Transformers Committee.

RAV:np
Encl.

# REPORT ON TECHNICAL PAPER ACTIVITIES

## (A) 1988 Winter Power Meeting (WPM)

The WPM was held in New York during the first week of February. There were two Transformer Sessions with a total of 8 papers presented. Of the 8 papers presented, 3 were co-authored by members of the Transformer Committee.

The 8 papers presented were selected from a total of 16 papers sent to us for review and grading. This means that 50% of the papers submitted for this session, were rejected by the reviewers. This is indicative of the high standards required for a paper to be accepted by the Transformer Committee.

## (B) Summer Power Meeting (SPM)

The SPM will be held in Portland OR. from July 24-29. There will again be two transformer sessions. The Transformers I session will be held on July 26, where 4 papers will be presented and the Transformers II session will be held on July 27, where 3 papers will be presented.

Twelve papers were submitted and reviewed by members of our committee during February and March. Of the 12 submitted, 7 were accepted and 5 rejected. Again,in the review process,I tried to distribute the papers over the full spectrum of the committee, so that some individuals would not be loaded down while others had no papers to review. Except for one individual, no member had more than two papers to review.

To review 12 papers, we require 48 reviewers, that is, each paper is reviewed by 4 different individuals. A total of 36 members were involved in this past review for an average of 1.37 papers per reviewer. I would like to thank the 36 members who gave their time to complete these technical paper reviews and who returned their review sheets and supporting statements, in a timely manner. This is an important responsibility for members of this committee and I am pleased with the high quality of the reviews returned to me.

I would like to say a few words again about the selection process. As I mentioned at our last meeting in New Orleans, it is easy to accept a paper when all 4 reviewers grade it "A" and it is also easy to reject a paper where all 4 reviewers grade it "RJO". This does happen sometimes, but often there will be "A" grades and "RJO" or "RJR" grades given for the same paper. It is then up to the Technical Publications Co-ordinator to make the decision based on all the reviews submitted and in some cases by reviewing the paper myself. It is therefore possible that a paper which you graded RJO, as not meeting the requirements of PES, is accepted and published.

Please don't think that your RJO was ignored, as it was not. There would most likely have been 3 A's to outweigh the one RJO or RJR and overall, I would have felt that the paper had sufficient merit to be accepted.

I would like to point out that if you had graded a paper RJO, and it was accepted, your review will form the basis of a good discussion on the paper. If you are able to attend the meeting, where the paper will be presented, you will be able to confront the author directly. If you are not able to attend, I am sure that the session chairman will be quite willing to read your discussion.

As the Transformers Committees' Technical Publications Co-ordinator, I am a member of the Technical Council's "Ad Hoc Publications Committee". This committee meets twice a year at the WPM and SPM. The following are the highlights of the last meeting held on Feb. 1 in New York:

1. The first item of business was a discussion on the confidentiality of the review of papers. It was agreed that the following statement shall be added to the RF-2 Review form.

   > "IEEE policy requires that referees treat the content of papers under review as privileged information not to be disclosed to others before publication. No one with access to a paper under review will make any inappropriate use of the special knowledge that access (??) provides."

2. The second item of discussion was on the requirement of a biographical sketch and photograph of each author. Present policy has the biographical sketch mandatory and the photograph optional and are included in the 7-page limit. After much discussion, it was the consensus opinion of the committee to leave the author's guide as is.

3. The third item of discussion was the identification of a paper submitted in response to a specific "call for papers". It was agreed that the authors "Declaration of Intent" form be modified to include a check off to specify the particular subject for which the paper was prepared.

4. The target for the number of papers to be presented at the 1989 WPM has been established. This target is based on a review of the papers given in the previous 5 years.

/3...

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P5



The Transformers Committee's target is 7. Since the target for all technical committees is 240, I would not hesitate to accept more than 7 papers, provided they meet the requirements of PES.

Robert A. Veitch
Vice-Chairman Transformers Committee/
Technical Publications Co-ordinator

March 31/87

# Transformers Committee

Scope: Treatment of all matters in which the dominant factors are the application, design, construction, testing and operation of transformers, reactors and other similar equipment. Included is treatment of the following:

Transmission and distribution transformers.

Voltage and load regulators (step and induction regulators)

Reactors and grounding transformers (joint with Surge Protective Devices Committee)

Insulating fluids

Insulating and dielectric problems relating to transformers.

Potential devices (in conjunction with Power System Relaying & Switchgear Committees)

Instrument transformers (in conjunction with Power System Relaying and Switchgear Committees)

Outdoor apparatus bushings

HVDC converter transformers and smoothing reactors

Power semiconductor rectifier transformers

Matters relating to transformers and regulators specifically designed for applications covered by certain other technical committees, such as Relays, Electronics, Surge Protective Devices, Communications, may be treated jointly with that committee if emphasis is on general principles, or exclusively by the application committee, if emphasis is on the particular requirements of the application.

ATTACH.
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Report of PES
Awards Committee

April 12, 1988

Certificate of Appreciation Awards were awarded to the Following:

L. S. McCormick - Technical Committee Distinguished Service Award

John J. Bergeron - For his work as Working Group Chairman on Revision of Dielectric Tests.

George Bryant - For his work as Working Group Chairman on Semiconductor Rectifier Transformers.

Upcoming will be nominations for the following:

1. PES Prize Paper Award
2. PES Working Group Award (Technical Paper)
3. PES Working Group Award (Standard or Guide)
4. W.R.G. Baker Prize Paper Award
5. Donald G. Fink Prize Paper Award
6. Browder J. Thompson Prize Paper Award
7. Alfred Noble Intersociety Award
8. Technical Committee Prize Paper Award Recipient
9. Technical Committee Distinguished Service Award
10. Technical Committee Working Group Recognition Award
11. "High Interest" paper to be published in "PES Review"

I request that each subcommittee chairman submit to me your recommendations for the above awards or recognitions.

Listed Below is the Selection of 1987 Prize Papers and Working Group Recognition Awards

---

Prize Papers:

"Qualification of Switchable Metal-Oxide Arresters for a Protective Level of 1.6 P.U. on Hydro-Quebec's 735-kV System," Yves Latour, Guy St-Jean, Andre Petit & Hieu Huynh, IEEE Trans. on Power Delivery, Vol. PWRD-1, No. 4, Oct. 1986 — SPD

"A Dynamic State Space Model of a MHO Distance Relay," Z. Peng, M. S. Li, C. Y. Wu, T. C. Cheng & T. S. Ning, IEEE Trans. on PA&S, Vo.. PAS-104, No. 12, Dec. 1985, pp. 3558-3564, pp. 184-193. — PSR

Working Group Recognition - Standard or Guide

"IEEE Trial-Use Guide for Maintenance Methods on Energized Power Lines," IEEE Std. 516-1986. — T&D
C. W. Gross, Chairman, Task Force on Live Line Maintenance.
F. C. Buchholz, M. Charest, W. H. Cole, D. A. Gillies, E. L. Harris, E. Hebert, N. W. Jackson, N. Kolcio, J. E. Lane, K. E. Lindsey, F. D. Myers, W. W. Olive, Jr., E. B. Shuler, J. W. Simpson, H. J. Stefanetti, J. M. VanName & J. R. Weyrauch.

Working Group Recognition - Technical Support

"Fault Induced Wave Distortion of Interest to Relay Engineers," IEEE Trans. on PA&S, Vol. PAS-104, Dec. 1985, pp. 3574-3584. — PSR
J. R. Linders, Chairman, Working Group on Wave Distortion on Consumers's Interconnection.
G. Babcock, R. W. Beckwith, J. R. Boyle, E. J. emmerling, W. E. Feero, J. A. Jodice, E. W. Kalstein, M. E. Kuczka, J. Lemezis, P. Longrigg, J. B. Patton, L. J. Powell & M. S. Sachdev.

D. A. Yannucci
04/08/88

036/DAY(2)

ATTACH. 4/88-Q
p1 of 15

# LIAISON REPORTS

Standards Coordinating Committee No. 4:
ANSI C92 Sectional Committee on Insulation Coordination - P.L. Bellaschi

No activity to report, Chairman A. R. Hillman has resigned and a new Chairman has been recently appointed.

ATTACH 4/88-Q
p2

TELEPHONE: 412/887-7700

**R. E. UPTEGRAFF MANUFACTURING CO.**
SCOTTDALE, PENNSYLVANIA 15683

March 31, 1988

Mr. Olin Compton
Virginia Power
P.O. Box 26666
Richmond, VA 23261

Dear Olin:

Attached is the liaison report on the current status of the ANSI C57.5 subcommittee standards activities. There has been no change in the roster of this subcommittee as presented in the October, 1987 Annual Report of the Accredited Standards Committee - 57. However, this roster will be reviewed with the objective of trying to expand the membership.

Respectfully,

R. E. Uptegraff, Jr.
Chairman
ANSI C57.12.5 Subcommittee

REUjr/sjb

cc: John Bergeron
John Dutton
Roger Ensign
James Harlow
Charles White

Encl.

ATTACH 4/88-Q
P3

'88

STATUS of ANSI DRY TYPE TRANSFORMER STANDARDS

| ITEM# | DESIGNATION | SPONSOR | STATUS |
|---|---|---|---|
| 2 | C57.12.01-1983 | IEEE | Draft-4 Balloted in IEEE Trans.Committee. Neg.votes, comments being resolved. |
| 20 | C57.12.50-1981 | NEMA | Balloting in ANSI Committee |
| 21 | C57.12.51-1981 | NEMA | Balloting in ANSI Committee |
| 22 | C57.12.52-1981 | NEMA | Balloting in ANSI Committee |
| 23 | C57.12.53-XXXX | | Designation available for assignment. |
| 24 | C57.12.54-XXXX | | Designation available for assignment. |
| 25 | C57.12.55-1987 | NEMA | Published. |
| 26 | C57.12.56-1987 | NEMA | Published. |
| 27 | C57.12.57-1987 | NEMA | Published. |
| 28 | C57.12.58 | IEEE | Returned by IEEE Standards Board for endorsement of IEC and IAS of IEEE. |
| 29 | C57.12.59 | IEEE | Submitted to IEEE Standards Board. Approval pending completion C57.96 |
| 30 | C57.12.60 | IEEE | Balloted in IEEE Trans. Comments & negative votes being resolved |

| | | | |
|---|---|---|---|
| 34 | C57.12.91 | IEEE | In IEEE Dry Transformer Subcommittee. To follow completion of C57.12.01 |
| 45 | C57.94-1982 | IEEE | Approved by IEEE Standards Board on 12/10/87. Now being balloted in ANSI Com. |
| 47 | C57.96-1959 | IEEE | Submitted for approval of IEEE Standards Board on 3/21/88 |
| 58 | C57.124 | IEEE | Draft 4 now being balloted in Dry Type Transformer Subcommittee. |

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| DESIGNATION | DESCRIPTION |
|---|---|
| C57.12.01 | General requirements for dry type distribution and power transformers |
| C57.12.50 | Requirements for ventilated dry type distribution transformers 500 kVA and smaller, single and three phase, 34500 volts and less. |
| C57.12.51 | Requirements for ventilated dry type power transformers 501 kVA and larger, three phase, 34500 volts and less. |
| C57.12.52 | Requirements for sealed dry type powr transformers 501 kVA and larger, three phase, 34500 volts and less. |
| C57.12.55 | Conformance standard for dry type transformers. |
| C57.12.56 | Test procedure, thermal evaluation of insulation systems for ventilated dry type power and distribution transformers. |
| C57.12.57 | Requirements for ventilated dry type network transformers 2500 kVA and smaller, three phase, 34500 volts and less. |
| C57.12.58 | Guide for conducting a transient voltage analysis of a dry type transformer coil. |

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| | |
|---|---|
| C57.12.59 | Dry type transformer through-fault current duration guide. |
| C57.12.60 | Guide for Thermal Evaluotion of Insulation Systems for Solid Cast and/or Resin Encapsulated Power and Distribution Transformers. |
| C57.12.91 | Test code for dry type distribution and power transformers |
| C57.94 | Recommended practice for installation, application, operation and maintenance of dry type distribution and power transformers. |
| C57.96 | Guide for loading dry type distribution and power transformers. |
| C57.124 | Guide for conducting partial discharge tests on dry type transformers. |

ATTACH.
4/88-Q
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# ANSI C 89 LIAISON REPORT

April 13,1988

1. NO ANSI C89 MEETING WAS HELD SINCE THE LAST REPORT

2. ANSI C89.2---DRY TYPE TRANSFORMERS FOR GENERAL APPLICATIONS

   - THE REVISED NEMA STANDARD (NEMA STD. ST-20) INCORPORATING REVISIONS TO REMOVE REFERENCES TO ABOVE 1.2KV TRANSFORMERS IS PUBLISHED AND IS IN LETTER BALLOT FOR APPROVAL AS ANSI C89.2.

3. ANSI C89.1---DRY TYPE MACHINE TOOL AND CONTROL TRANSFORMERS (NEMA ST-1)

   - A NEGATIVE BALLOT ON REVISIONS TO NEMA ST-1 HAS BEEN RESOLVED AND RE-AFFIRMATION AS ANSI C89.1 WILL BE UNDERWAY SHORTLY.

S. J. ANTALIS

LIAISON REPRESENTATIVE

ATTACH. 4/88-Q
P7

**Colt Industries**

**Central Moloney**
**Transformer Division**
P.O. Box 6608
Pine Bluff, Arkansas 71611
501/534-5332

March 11, 1988

Mr. O. R. Compton
Virginia Power
Box 26666
Richmond, Virginia 23261

Liaison Report: ANSI C57.12.2 Sub-Committee On Distribution Transformers

Dear Mr. Compton,

This group met shortly before our last meeting, and is scheduled to meet in Washington on April 14-15, 1988.

The ANSI Standard C57.12.28 on Cabinet Security has been published with a 1988 date, and all padmount standard revisions in approved status which reference this document should now be published in 1988 also.

The new standard for Cabinet Security in severe environments continue to be studied, with a task force meeting twice this year in an effort to define substrate and environmental conditions before the full working group continues discussions.

A report on these activities will be provided at the fall meeting at Long Beach.

Sincerely,

C. P. Kappeler

CPK:vls

ATTACH.
4/88-Q
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February 18,1988

Mr. Olin R. Compton,
Virginia Power
RP-1 East
P.O. Box 26666
Richmond VA 23261

Dear Olin: Subject: Liaison Report - C57.15

This Committee has not met for several years. I believe that a meeting may be scheduled within the next six months.

Sincerely,

A. C. Wurdack

A. C. Wurdack

ATTACH. 4/88-Q
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John C. Dutton Enterprises, Inc.
Consulting Engineering
120 Hycliff Road
Rome, GA 30161
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## LIAISON REPORT - ANSI C57.12.10
## SUBCOMMITTEE ON POWER TRANSFORMERS

The combining of ANSI C57.12.10 and C57.12.30, plus revisions, has been the principal activity for the last few years. Happily, that work and balloting are complete and the final document is passing through its last stages in ANSI.

I have received a copy of the proof for checking, and will soon be returning it to ANSI. This is an encouraging sign of progress.

John C. Dutton
3/21/88

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# LIAISON REPORT
# CIGRE SC-12 (TRANSFORMERS)

by
W. J. McNutt, U.S. Representative to SC-12

There has been no meeting of SC-12 since the last Transformers Committee meeting, but the next meeting will be held in Paris on September 2, 1988, in conjunction with the General Session. The Preferential Subjects for papers at the General Session are "Losses In Transformers And Reactors", and "Environmental Considerations Of Transformers And Reactors". The latter subject includes audible noise, fire and safety concerns (tank rupture), and heat removal. There will also be a floor discussion of "Static Electrification Problems" under the heading of topics of current interest.

I have submitted my resignation as the U.S. Representative to SC-12, and it is expected that I will be officially replaced by Bill Kennedy of Westinghouse at the Paris meetings.

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Liaison Report
on
PES Surge Protective Devices Committee and ASC C62
by
E. J. Yasuda

The following summarizes the Surge Protective Devices Committee (SPDC) Meeting held on October 2, 1987, in Montreal and the ASC C62 Committee Meeting held on October 2, 1987, in Montreal, Quebec.

SPDC Fall '87 Meeting in Montreal

- On October 1, 1987, during the SPDC Meeting Mr. Floyd Berg of WAPA passed away in Montreal. Being a long time and active member of SPDC, we will surely miss him.

- The special event for the Fall '87 meeting was a tour of Hydro-Quebec's Chateau Guay HVDC back-to-back terminal.

- Starting January 1, 1988, the new officers of SPDC are:

  Chairman: John Hetrick of Ohio Edison
  Vice Chairman: Joe Osterhout of Joyslyn
  Secretary: Steve Whisenant of Duke Power
  Past Chairman: R. D. Ball of Kearney

- Status for the various revisions to and new standards under SPDC are shown in Attachment A. Standards of most interest to the Transformer Committee are shown with asterisk.

- The next SPDC Meeting will be held on April 25-29, 1988, in Mesa, Arizona.

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## ASC C62 Committee Meeting - October 2, 1987, in Montreal

- Two standards (Revision to C62.2 and C62.92.1) were recently balloted and approved. C62.2 is the Application Guide for SiC Arresters and C62.92.1 is the Neutral Grounding Application Guide.
- In preparation for the June 6-11, 1988, IEC TC 37 Meeting in Gaithersburg, Maryland, the IEC Subcommittee held a meeting January 6, 1988, in Pittsburgh, Pennsylvania, to establish U.S. positions on proposed revisions to IEC 99-1 and the new IEC MOSA Standard.
- Status for the various ANSI Standards are shown in Attachment A.
- The next ASC C62 meeting will be held April 27, 1988, in Mesa, Arizona, at the Ramada Renaissance Hotel.

ATTACHMENT A



STATUS OF ACS C62 STANDARDS PROJECTS

| | ANSI NUMBER | PROJECT I.D. | IEEE NUMBER | IEEE SPR DATE | TITLE | PRESENT STATUS |
|---|---|---|---|---|---|---|
| * | C62. 1-1984 | P28 | 28 | / / | Surge Arresters for AC Power Circuits | Approved as ANSI Sept 1984 |
| * | C62. 2-1981 | P684 | | 09/08/77 | Guide for the Appliction of Valve Surge Arresteers for AC Systems | |
| * | C62. 2-1987 | PC62.2-198X | C62.2-198X | 03/13/86 | Guide for the Application of SiC Gapped Surge Arresters | Approved as by ASC C62 in May 1987 |
| * | C62. 2.01 | P1041 | | 06/14/84 | Application Guide for Surge Protedtion of Electrical Generating Plants | Initial work has begun in IEEE in WG 3.4.14 in SPD |
| * | C62.11-1987 | P819 | C62.11 | 03/13/80 | Metal Oxide Surge Arresters for Alternating-Current Power Circuits | Approved as an American National Standard January 16, 1987 |
| | C62.21-198X | P687 | C62.21 | 09/08/77 | Applicaton Guide for Surge Voltage Protective Equipment on AC Rotating Machinery | Draft in progress |
| * | C62.22-198X | PC62.22 | C62.22 | 03/13/86 | Guide for Application of Metal Oxide Surge Arresters for AC Systems | This is a new standard Published 7/24/87 |
| | C62.31-1984 | | C62.31-1984 | / / | Test Specification for Gas Tube Surge Protective Devices | Approved ANSI Std. September 4, 1985, Reaffirmed at SPD Oct. 1986. Being balloted by ACS C62 Ballots due July 6,1987 |
| | C62.32-1981 | | C62.32-1981 | / / | Test Specification for Low Voltage Air Gap Surge Protective Devices | Approved ANSI 1982,Balloted in SPD for re-affiramtion on May 8, 1987 |
| | C62.33-1982 | | C62.33-1982 | / / | Test Specification for Varistor Protective Devices | Approved ANSI Std. July 1, 1982 Balloted for re-affirmation in SPD May 8, 1987 |
| | C62.35-198X | P456.4 | C62.35-198x | / / | Test Specification for Avalanche Junction Semi-conductor Surge Protective Devices | Balloted by SPD on September 8, 1985 |
| | C62.36-198X | P1039 | C62.36-198x | 03/24/84 | Standard Test Methods for Surge Protector Used in Low Voltage Data Comm., and Signal Circuits | Draft in progress in IEEE SPD |
| | C62.37-19xx | | C62.37-19xx | | Standard Test Specification for Thyristor Diode Surge Protective Devices | SPAR being submitted to IEEE Standard Board |
| | C62.41-1980 | | 587 | 01/01/80 | Recommended Practice for Surge Voltages in Low Voltage AC Power Circuits | Approved ANSI Std. January 31, 1985 |

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STATUS OF ACS C62 STANDARDS PROJECTS

| ANSI NUMBER | PROJECT I.D. | IEEE NUMBER | IEEE SPR DATE | TITLE | PRESENT STATUS |
|---|---|---|---|---|---|
| C62.41-198X | C62.41-198x | C62.41 | 05/19/86 | Recommended Practices for Surge Voltages in Low Voltage AC Power Circuits | Revision in progress in IEEE SPD |
| C62.42-1986 | P769 | C62.42 | 03/15/79 | Low Voltage Surge Protective Devices, Gas Tube Application Guide | Approved IEEE Standard March 3, 1986, ANSI approved October 29, 1986 |
| C62.43-198X | P950 | C62.43 | 06/10/82 | Guide for Surge Voltages in Data, Industrial Control and Communication Circuits | Draft in progress(October 1986 SPD meeting indicated that little work is being done on this project) |
| C62.44-198X | P953 | C62.44 | 05/10/82 | Data Manual on Surge Vulnerability of Components in Low Voltage Circuits | Draft in progress in IEEE SPD |
| C62.45-1986 | P932 | 932 | 12/17/81 | Guide on Surge Testing for Equipment Connected to Low Voltage AC Power Circuits | Approved IEEE Std. Bd. Sept 1985, Approved by ANSI October 29, 1986 (Changes approved by SPD Spring 87) |
| C62.47-198X | P1093 | | / / | Guide on Electrostatic Discharge Characterization and Testing for Withstand Capability | Draft in progress in IEEE SPD |
| C62.61-1985 | | ECSA | / / | Specification for Gas Tube Surge Arresters on Wire Line Telephone Circuits | Approved ANSI Std. October 2, 1984, PEG is considering an update of this standard(Minutes PEG meeting March 3, 1987) |
| C62.61-198X | | ECSA | / / | Specification for Gas Tube Surge Arrestres on Wire Line Telephone Circuits | Draft in progress in the Protection Engineers Group (PEG) |
| C62.62-198X | P1039 | | 03/24/84 | Performance Characteristics for Surge Protective Devices Connected to Low Voltage Circuits | Draft in progress in IEEE SPD |
| C62.91-198X | P32 | 32-1972 | / / | Requirements, Terminology, Test Procedures for Neutral Grounding Devices | PAR approved for revision and redesignation of IEEE Std 32-1984 as C62.91-198x at IEEE Standard Bd. meeting 12/12/85 |
| C62.92.1-19 87 | P143 | C62.92.1 | 09/07/77 | Neutral Grounding Application Guide | Approved by C62 on April 17, 1986. BSR sent to ANSI in August 1987 |
| C62.92.2-19 xx | P143 | C62.92.2 | 09/07/77 | IEEE Guide for Neutral Grounding in Electric Utility Systems | Under development by WG. 3.5.1 in SPD of IEEE |
| C62.92.3-19 xx | P143 | C62.92.3 | 09/07/77 | IEEE Guide for Neutral Grounding in Electric Utility Systems - Auxilary Systems | Under development in WG. 3.5.3 in IEEE SPD |

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STATUS OF ACS C62 STANDARDS PROJECTS

| | ANSI NUMBER | PROJECT I.D. | IEEE NUMBER | IEEE SPR DATE | TITLE | PRESENT STATUS |
|---|---|---|---|---|---|---|
| * | C62.92.4-19 P143 XX | | C62.92.4 | 09/07/77 | IEEE Guide for Neutral Grounding in Electric Utility Systems - Distribution | Under development in WG. 3.5.4 of IEEE SPD |
| * | C62.92.5-19 P143 XX | | C62.92.5 | 09/07/77 | IEEE Guide for Neutral Grounding in Electric Utility Systems - Transmission and Substrannission Sys. | Under development in WG. 3.5.5 in IEEE SPD |