IEEE/PES TRANSFORMERS COMMITTEE
DRY TYPE TRANSFORMERS SUBCOMMITTEE MEETING MINUTES
OKLAHOMA CITY, OKLAHOMA USA – OCTOBER 23, 2002

Chair: Wesley F. Patterson, Jr.
Secretary: Charles W. Johnson, Jr.

1 Chair Remarks and Announcements

The Dry Type Transformer Subcommittee met at 1:30 PM on October 23, 2002 with 12 members and 8 guests present; 5 guests requested membership. Paulette Payne chaired the meeting. Introductions were made and the attendance roster was circulated. Minutes from the April 17, 2002 meeting were reviewed and approved.

The acting chair gave a report on the activities of the Administrative Subcommittee meeting.

The subcommittee was reminded that the working group members are required to participate and not just attend the meetings. A suggestion was made for working group chairs to consider removing inactive members from the group.

1.1 Working Group Reports

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

2.1 WG Dry Type Smoothing Reactors IEEE 1277 **R. Dudley**
2.2 WG Dry Type Test Code C57.12.91 **D. Barnard**

1.2 New Business

- Regarding standards C57.12.58 and C57.12.124, Jeewan Puri and Don Kline are reviewing these documents, respectively, and will have comments by Thanksgiving.
- Standards C57.12.56 and C57.12.60 will be combined into one document. Working group chair Dick Provost will schedule a task force meeting for this work around Christmas 2002.
- Max Cambre gave a presentation on standard C57.12.58. Max stated that the appendix on page 22 was "incomprehensible" (he provide the document as evidence), and he has rewritten the section. He also provided a simple graph to clarify the formulas. This info will be included in a revision for balloting (a PAR will be required for this purpose). Paulette Payne will send info on negative ballots to Don Kline, Max Cambre, and Jeewan Puri.
- Don Kline reported on the failure of medium-voltage transformers where most were of Dry Type design. The cause of failure appears to be due to the interaction of the transformer and vacuum circuit breakers. The use of "snubbers" can minimize the risk of failure. The only way to tell if there is a problem is if a transformer fails upon energization. The "snubber" reduces the transient voltage to "1/2" which eliminates the failures. Customers have asked why transformers cannot withstand these failures. It was suggested that the chopped wave impulse test be used to simulate the transient voltage generated by the vacuum circuit breaker. Don Kline questioned whether the impulse test should be a "routine" test for transformers connected to this type of breaker. Phil Hopkinson asked whose responsibility it really is since we have both over-current and over-voltage devices. It was noted that the liquid standard is being revised. Discussion ensued on the validity of whether the chopped wave impulse test would be sufficient to verify the withstand of the transient voltage caused by the vacuum circuit breaker.

Being no further new business, the meeting was adjourned.

1.4. **Attendance Roster**

Members Present
David Barnard
Carl L. Bush
Max A. Cambre
Richard F. Dudley
Michael E. Haas
Phillip J. Hopkinson
Anthony J. Jonnatti
Sheldon P. Kennedy
Alexander D. Kline
Richard P. Marek
W. E. Morehart
Paulette A. Payne

Members Absent
Kal Atout
Edwin F. Brush
Timothy Darr
Derek R. Foster
Jerome M. Frank
Robert E. Gearhart
N. Wayne Hansen
Rush B. Horton, Jr.
Mike Iman
Charles W. Johnson
Lars Erik Juhlin
Lawrence A. Kirchner
Egon Koenig
Tim Lewis
Don MacMillan
Nigel P. McQuin
Michael I. Mitelman
Y.I. Musa
William H. Mutschler
Klaus Papp
Wesley F. Patterson, Jr
Linden W. Pierce
Guy Pregent
Richard L. Provost
Dilip R. Purohit
R. W. Simpson, Jr
Tark Singh
John C. Sullivan
Vis Thenappan

Guests Present
Jim Antweiler
Joe Ashley
Tom Callsen
Scott Choinski
Larry Davis
Kent Haggerty
Hemchandra Shertude
Roger Wicks

Attendance Summary

	Present	Absent
Members:	12	29
Guests:	8	

2 Working Group Reports

2.1 Working Group on Dry Type Reactors

Chair: Richard Dudley

The Dry Type Reactor W.G. met in Meeting Room 15 of the Cox Business Center in Oklahoma City, Oklahoma on Oct. 21, 2002 from 9:30 a.m. to 12:00 noon. There were 7 members and 3 guests present. Two of the guests requested membership. The following are the highlights of the meeting.

1. The minutes of the Vancouver meeting were approved.

2. Peter Balma made a presentation on the status of the reaffirmation process for C57.21. Current focus is on the resolution of 5 negative ballots. Peter has prepared a letter response to the negative balloters incorporating input from Richard Dudley's review of the negative ballots. A number of the negative ballots were based on the significant number of OCR based errors resulting from IEEE's scanning of the document. There were also more substantive reasons for some of the negatives. The letters basically asked the negative balloters to withdraw their negative ballots based on IEEE correcting the OCR errors and a promise to address the valid substantive concerns during the next revision process. A PAR will be raised in the near future after completion of the reaffirmation. One balloter has withdrawn his negative on the above basis. Peter will follow up with phone calls to the remaining four.

   Pierre Riffon's general comments and comments to the negative ballots were discussed.

   (i) In the next revision of C57.21 Pierre thinks that the document will be clearer if there is only a single table of voltage insulation levels for oil immersed and dry type shunt reactors. Test code can be design specific but dielectric test levels should be common.

   (ii) The mega volt-ampere rating is printed as mVA and not MVA. Can this obvious error be corrected as it is in the same category as a spelling error. Is a PAR required for a corrigenda? Is it more effective to raise a PAR for a full revision once the document is reaffirmed? The error has been in the document for 12 years. Is it serious enough to warrant immediate action? The consensus is that it is not.

   (iii) Can obvious editorial changes be made? It is assumed that the OCR based problems can be corrected.

   (iv) The negative ballot of Carlos Piexoto based on the premise that there should be different LIWL and SIWL for dry type SRs vs oil immersed reactors was recommended to be rejected. LIWL and SIWL levels should only be based on system requirements and insulation co-ordination practice.

   (v) Ramon Garcia's comments should be considered during the next revision process with the exception of including wording on laboratory limitations. Shunt reactors must be tested to specification and appropriate investment in test equipment should be made. This is essential for reliable functioning of shunt reactors in the power system.

   (vi) The appropriate voltage level (100% or 105%) at which to carry out sound level testing will be discussed during the next revision process.

1. Draft #4 of Annex A covering thryistor controlled shunt reactors was reviewed. Pierre Riffon's comments were reviewed. His editorial comments and clarifications were accepted.

   The following are key points that were discussed.

(i) A reference will be included on the affect of capacitance to ground on the di/dt seen be the thryistor; one coil vs two coils per phase.

(ii) To simplify calculation of losses in TCRs at various SVC operating points a preferred reference temperature, such as 75°C, may be used.

(iii) The consensus of the W.G. was that the work on Annex A was complete. The W.G. and perhaps the PC S.C. should be balloted to obtain input. The objective will be to ballot a group that has the highest level of interest in the subject matter of this annex. The chairman will raise the subject at the PC S.C. and Dry Type Transformers S.C. meetings.

1. Draft # 3 of Annex B covering dielectric stresses imposed on shunt reactors during switching was reviewed. The following are the highlights.

(i) The focus of the annex should be on how to specify the dielectric capability of SRs for the highly repetitive switching operations to which they are typically exposed. The circuit breaker and shunt reactor combination should not impose stresses on the SR beyond a specified value; maximum value that the SR should withstand.

(ii) The annex will present general methodologies for calculating the stresses imposed on SRs by CBs and what can be done to mitigate or reduce the stresses such as damped capacitor networks (possible solution that needs to be evaluated).

(iii) A draft of Annex B should be sent to the Switchgear and Protective Devices Committee for input; timing of the submittal needs to be determined. The PAR that will be raised to revise C57.21 should request co-ordination with the CB S.C. Input from the CB S.C. should include; objectively of annex re CBs, evaluation of CBs for SR switching (annex should not recommend), correctness of CB evaluation process, etc.

(iv) Pierre Riffon's comments on Draft #3 were discussed and were accepted with only minor changes required in some cases. Since Annex B is to be informative "should" and "could" will be used vs "shall" and "will". References to voltage class will be numerical and not by descriptors such as "high" and "extra high".

(i) Input is required for B.6 of Annex B on maximum switching transient overvoltages that shunt reactors should be exposed to as a % of BIL and SIWL. It should be guaranteed that the installed shunt reactor should not be exposed to higher numbers and the shunt reactor should be designed to withstand the repetitive nature of switching transients overvoltages of these values.

1. A discussion of references in C57.21 took place. The W.G. felt that the valid reference is the date referenced document and not the latest version. The document referenced when the standard was published is the valid reference. This is critical for a number of issues; specificity of referenced information, testing methodology and test levels, safety, etc. What does the IEEE Style Manual require? A comment could be made in the references section; "referenced edition" or "latest edition if applicable". The chairman stated that he would bring this subject up at the PC S.C. and Dry Type Transformers S.C. meeting and main committee meeting.

The W.G. meeting adjourned at 12:00 noon.

2.2 Working Group on Dry-Type Test Code - C57.12.91

Chair: Mr. Dave Barnard

The working group met at 1:55 pm with 6 members and 6 guests present. Five guest requested membership.

After introductions the chairman asked for comments and/or corrections to the minutes from the Vancouver, BC meeting. There being no comments Don Kline moved and Rick Marek seconded to accept the minutes as written. The motion carried.

Old Business:

1. The IEEE Standards Board has sent copies of the revised C57.12.91-2001 to all the working group members, except Max Cambre. The Chairman will contact IEEE to see why Max did not receive his copy.
2. Jeewan Puri addressed the working group as chairman of the Sub-Committee on Audible Sound and Vibration. Jeewan stated that his sub-committee has approved a re-write of Clause 13 in C57.12.90 to include an option for the user to specify sound intensity measurements. He suggested that our working group make a similar change. Jeewan will email a copy of the revised Clause to the WG Chair, who will intern send it to all the members for review. Before this change could be adopted, a new PAR would be required.
3. SubashTuli was not present to make comments on adopting IEC cooling class designations. The chairman will ask for a volunteer from the WG to review these proposed changes and make a recommendation at the next meeting.
4. Wayne Hansen was not present to provide wording for the changes he recommends to the next revision on Insulation Power Factor Testing. This item will be dropped from future agendas.
5. Nigel McQuin was not present to provide his comments on wording for his proposed changes on resistance measurements, dielectric tests and temperature testing. The chairman will ask for a volunteer from the WG to review these proposed changes and make a recommendation at the next meeting.

New Business:

1. Don Kline informed the W.G. that at least one customer requested “noise” level measurements be made at full voltage and current. It was noted that this is not in accordance with the standard. It was also noted that this is impractical above a certain kVA, depending on the manufacture. Furthermore, it is the opinion of those present that the added noise from the energized winding would be insignificant to the total sound level. There was no motion to further address this issue.
2. The chair will submit a new PAR before the next meeting to address the changes referenced in the minutes.

A motion was made and seconded to adjourn, meeting adjourned at 2:30 pm.