7.7 DRY TYPE TRANSFORMERS SC CHAIRMAN C. W. JOHNSON, JR.

7.7.1 Introductions and Approval of Minutes

The Dry Type Transformer Subcommittee met in Costa Mesa, CA on Wednesday March 22, 2006 with 14 members and 10 guests present. Introductions were made and the attendance roster was circulated. Minutes from the October 26, 2005 Memphis, TN meeting were reviewed and approved.

The chair reminded the attendees that the minutes posted after each meeting were unapproved and would not be approved until the next meeting.

7.7.2 Working Group/Task Force Reports

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

7.7.3 WG Dry Type Test Code C57.12.91 Chairman Derek Foster

1 The working group met at 3:15 pm with 10 members and 7 guests present. Those present introduced themselves.

2 There were no comments regarding the minutes from the October 24, 2005 meeting in Memphis, TN. The minutes were approved as written.

3 The Chairman asked if anyone present had any information regarding patent issues, which may affect the work of the group. No replies were received.

4 Old Business

The Chairman informed the Working Group that the PAR for amendment of the standard was approved in June 2005. The title of the standard will be extended to "IEEE Standard Test Code for Dry-Type Distribution and Power Transformers – Amendment 1.

Four sections of the standard are included in the PAR:

Section 5	Resistance measurements
Section 10	Dielectric tests
Section 11	Temperature test
Section 13	Audible sound level measurements

The majority of the meeting was spent reviewing comments from Arthur Molden and Marcel Fortin, concerning Section 10 of the standard, Dielectric Tests. The working group accepted most of the comments as proposed or with minor modifications. The results of the discussion of these comments on Section 10, with changes or additions indicated in RED, will be circulated to all members of the Working Group.

5 There being no new business, the meeting was adjourned at 4:40 pm.

7.7.3 WG Dry Type Thermal Evaluation C57.12.56/60 Co-Chairman Roger Wicks

The working group met in Costa Mesa at the Hilton Hotel at 1:45 PM on Monday, March 20, 2006 with 10 members and 8 guests present. Attendees introduced themselves and signed a roster.

The Vice-Chair reviewed the minutes from the last meeting, which were approved as read. The chair reviewed the patent documents for our meeting, and no patent related issues were noted for the work of this working group.

We had a fairly informal discussion related to the status of the work of this working group. There was some discussion regarding the acceptability of models vs. full size units. The advantage of the models are the quantity which can be built and tested which helps "statistics", however, some issues which come up when producing full-size coils (even smaller, say 500 kVA coils) are masked. The variety of construction methods used to produce coils make inclusion of specific models in this standard difficult. We may want to include models as an option only. An alternative would be to have better examples in an informative annex.

There is still a consensus within the working group that we should continue with this work to combine the documents, as the general process to thermally evaluate these transformers is essentially the same, with the exception that the cast coil is primarily a high voltage coil test only, whereas for the OVDT equipment, the HV coils are wound over the LV, so they are tested together.

It was agreed that the working group should review again each of the two documents to better understand the similarities and differences of the two documents and report back to the chair at the next meeting. The vice-chair will work with Sue McNally to get a website added to the main site so that the documents can be placed for working group members to access. Finally, anyone with information regarding an IEC method which looks at weight loss, as was mentioned in the last meeting, should bring this information to the next meeting. This may be a component test (for resins/varnishes/plastics?). No one is aware of this as a system test (TC112), nor a transformer test (TC14).

Meeting adjourned at 2:30 PM.

7.7.3 Dry Type Reactor TF — Chairman Richard Dudley

The Dry-Type Reactors T.F. met in the Balboa I Meeting Room of the Hilton Costa Mesa Hotel in Costa Mesa, California on Mar. 20, 2006 at 8:00 a.m. There were 9 members and 5 guests present. Lewis Powell requested membership. The following are the highlights.

1. The minutes of the Dry-Type Reactors T.F. meeting in Memphis were approved.

   NOTE: The minutes of the Costa Mesa meeting of the T.F. will not be approved until the meeting in Montreal, Quebec.

2. IEEE patent policy was reviewed and no patent issues were identified.

3. The remainder of the meeting was devoted to the revision of IEEE C57.16. The following are the key points.

   (i) The current version of IEEE C57.16 will reach its "end of life" in Oct. 2006. The Chairman, RFD, will apply for a PAR prior to that date.

   (ii) RFD has received input from various members of the IEEE Switchgear Committee on Draft #5 of ANNEX E; CB TRV issues associated with the application of CLRs. RFD informed T.F. members that Jeff Nelson, Chairman of the IEEE Switchgear Committee, believes there are jurisdictional issues associated with ANNEX E. RFD will produce Draft #6 of ANNEX E and will attempt to mitigate the jurisdictional issues; ANNEX E is informative ONLY, introduction will stress that the purpose of the annex is to alert standard users to the possible CB TRV issues associated with the application of CLRs and will direct the standard users to appropriate IEEE Switchgear standards and guides that are appropriate, examples are included to provide insight, proposed mitigation of using capacitors is largely descriptive etc. T.F. members supported this approach; especially utility engineers that are members of the T.F. (Less Recksiedler, Paulette Payne, Peter Zhao. They felt the included examples are very helpful and that ANNEX E could help less experienced utility engineers and also help co-ordinate reactor application projects within a utility. References in ANNEX E will be updated and expanded; including a reference to an IEEE published tutorial on switching. RFD will resubmit D6 to the SWC and will continue a dialogue with Jeff Nelson and other contacts in the SWC.

   (iii) Table 5 should include reduced BILs for various system voltage classes.

   (iv) Audible sound testing of FRs will be included in the annex covering FRs; requested by Les Recksiedler and accepted by the T.F. Les pointed out that mitigation of noise problems in the field is very costly. Sound measurement methodology will be provided in sufficient detail and will also be co-ordinated with information in the IEEE sound measurement guide now under preparation. Measurement of sound produced by FRs under harmonic loading is possible with equipment available today; measurement of sound at individual harmonic frequencies and calculation of total sound power under combined harmonic loading.

   (v) It was suggested that the IEEE siting guide during its next revision should be updated to include SVC equipment; transformers and reactors.

   (vi) Comments received during the last reaffirmation of IEEE C57.16 will be included in the revision; Draft #1.

(vii) Reactors are sometimes supplied in steel or FG enclosures for personal protection. Reactors are also supplied in special enclosures for sound mitigation. A separate section or a normative annex will be added to provide some background information plus specific test code requirements; temperature rise test (including the enclosure), impulse testing (including the enclosure) etc. The magnetic clearance information in the informative annex will be upgraded to include information on reactors (especially CLRs) installed in utility designed/supplied cells.

(viii) Fault current limiters are being developed. A discussion took place as to where they should be covered in IEEE standards. No conclusion was reached except the observation that fault current limiters are not sufficiently developed to warrant inclusion in a standard.

(ix) An informative annex will be developed on de-Q'ing of FRs; with a focus on impact on test code which will be highly dependent on the de-Q'ing methodology. Les Recksiedler will produce a draft.

The meeting adjourned at 9:15 a.m. The chairman stated that he would prepare draft material except as specifically noted in the minutes. Note that input was requested re the revision of IEEE 1277 re dry type SMRs but T.F. members had no suggestions.

7.7.3 Old Business

1 The chair announced that John Sullivan had informed him that draft 6 of IEEE C57.12.01, "Standard General Requirements for Dry Type Distribution and Power Transformers Including Those with Solid-Cast and/or Resin Encapsulated Windings", had been approved at REVCON. The document was now under editorial review and that the standard would be published this spring.

2 Paulette Powell informed the subcommittee that the reaffirmation ballot for IEEE C57.134, "IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers", was successfully completed and that the document has been submitted to REVCOM for approval.

3 Tim Lewis informed the subcommittee that the reaffirmation ballot for IEEE C57.94, "IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry Type General Purpose Distribution and Power Transformers" was still open as there were unresolved negative ballots. The Chair suggested that Tim contact Jodi Haas for support in addressing the negative ballots allowing us to expedite reaffirmation.

7.7.4 New Business

1 The Chairman reviewed the status of all Dry Type Transformer standards.

1 Marcel Fortin questioned the status of the 3 task forces formed to address the negative ballots on draft 6 of IEEE C57.12.01. Marcel reminded the subcommittee

that his reversal of his negative ballot was predicated on resolving the negative comments through the task forces. The chair will contact John Sullivan for an update on the status of the task forces.

2 The chair reminded the subcommittee that IEEE C57.12.91, "IEEE Standard Test Code for Dry-Type Distribution and Power Transformers", requires reaffirmation this year. Although there is an open PAR for amendment of the document with an expiration of 2009, the document still needs to be balloted this year.

3 A suggestion was made that we review IEEE C57.124 "Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers" and possibly combine or coordinate with IEEE C57.113 "IEEE Guide for Partial Discharge Measurement in Liquid-Filled Transformers and Shunt Reactors".

4 Arthur Molden expressed interest in reviewing IEEE C57.12.58 "IEEE Guide for Conducting a Transient Analysis of a Dry-Type Transformer Coil". He will need a copy of the standard and the chair agreed to supply one

5 Bill Simpson noted that the personal information listed for working group chairs was out of date in the Standards Status Report. I will inform Bill Chiu that the information needs to be updated.

2 The chair stated that Bill Chiu had informed him that the four (4) NEMA documents, (C57.12.50, C57.12.51, C57.12.52, and C57.12.55) whose copyright was transferred from NEMA to the IEEE Transformers Committee, will require as new documents for the process of becoming IEEE documents. The following people agreed to lead the documents through the approval process

C57.12.50 – Carl Bush
C57.12.51 – Paulette Powell
C57.12.52 – Sheldon Kennedy
C57.12.55 – Charles Johnson

As there were no electronic copies of these documents, Roger Wicks "volunteered" his wife to type the documents into MS Word as a 1st step.

3 There being no further business, the subcommittee meeting adjourned at 2:45 PM.