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 San Diego at the Catamaran Resort Hotel at 1:30 PM on March 10, 2004 with 17 members and 6 guests present; 2 guests requested membership. Minutes from the October 8, 2003 meeting were reviewed and approved.

7.7.2 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:

7.7.2.1 WG Dry Type General Requirements C57.12.01 Chairman John Sullivan

The working group met in the Boardroom East of the Catamaran Resort Hotel.

Chairman John Sullivan called the meeting to order at 1:45 PM on Monday October 8, 2004 with eleven (11) members and six (6) guests present.

Introductions were made.

The Pittsburgh meeting minutes were approved.

The current status of the C57.12.01 standard was discussed:

- The working Group was granted a PAR extension to 31 December 2005.
- During the first week of April 2004:
  a. The Standard will be sent to the IEEE editorial staff for review.
  b. At the same time the standard will be circulated to W.G. members for review.
- Corrections will be made and the Standard submitted for ballot.

E-mail is still a problem. During the last mail out some address still were not correct and some e-mail was not accepted for “policy reasons”.

Without a valid working e-mail address members will not receive review copies of the standard. Also, members need to provide the IEEE Balloting Pool with a valid working e-mail address to receive ballot information. The Ballot Pool web site is:
http://standards.ieee.org/db/balloting/ballotform.html

There being no further business, the meeting was adjourned.

7.7.2.2 Dry Type Reactor TF Chairman Richard Dudley

The Dry Type Reactors T.F. met in the Boardroom East of the Catamaran Resort Hotel in San Diego, CA on Mar. 8, 2004 at 8:00 a.m. There were 7 members and 4 guests present. Two of the guests requested membership. The following are the highlights of the meeting.

1. IEEE C57.16-1996 (R2001) will be up for Reaffirmation or Revision in 2006. The Dry Type Reactor T.F. became a W.G. in 1990 to produce the current version of C57.16 and continues to monitor the document re possible future changes or revisions. Possible future revisions were discussed as follows.

(i) Filter reactors may employ taps. In some cases, especially filter reactors used in conjunction with HVDC, the tap step size is within the accuracy tolerance of the bridge or electronic wattmeter used to measure losses and inductance (reactance). T.F. members reached a consensus that it was reasonable to measure the inductance in steps of sufficient size (for example 1%) to provide good measurement resolution; 3 or more points. The results could then be used to generate a graph of inductance for the tapping range. The Chairman, Richard Dudley, agreed to produce a draft proposal for inclusion in the test code in the annex to C57.16 covering filter reactors.

(ii) The T.F. felt that an informative annex should be added to C57.16 covering circuit breaker TRV issues associated with the application of series reactors; distribution class and transmission class. Pierre Riffon mentioned that an IEC W.G. had produced a draft document on TRV issues associated with circuit breakers used with series reactors; IEC 17A/686/CD. The document will be an amendment to the IEC circuit breaker standard. Pierre Riffon will provide a copy of the draft document as a reference for T.F. members. Note that IEEE Switchgear Committee members were involved in the work and the IEEE Switchgear Committee may adopt the document. One of the major recommendations in the IEC document is that capacitors across the reactor or to ground can modify the TRV of the CB. The Chairman, Richard Dudley, agreed to produce a draft informative annex, as a proposed revision to IEEE C57.16, describing the reaction/circuit breaker TRV phenomenon and mitigation.

(iii)The option of compensated or non-compensated 3 phase stacked current limiting reactors (CLRs) was discussed. If 3 phase stacked CLRs are compensated (equal impedances including the effect of coupling) then in the case of single phase to ground faults, fault current limiting is not the same in all 3 phases. In the case of a 3-phase fault, fault current limiting is the same in all 3 phases and this is important for current breaker performance. Pierre Riffon and Paulette Payne felt the wording of Clause 7.2.5 was adequate as is.

(iv)Table 5 covering dielectric test levels etc. should be reviewed and modified to reflect current practice. Table 5 in C57.21, the shunt reactor standard, is in the process of being modified and will be used as a starting point. Focus will be on BIL levels versus system voltage class. Some BIL levels are no longer used and others are inadequate. Exceptions, including much-reduced BILs, will be addressed in a note. Work under way re the revision of similar tables in the power transformer standard will be taken into consideration. Pierre Riffon agreed to produce a draft revision for Table 5.

(v) Discussion took place on the subject of BIL across the reactor vs to ground and whether this should be covered in a note. Tony Weekes pointed out that a note to Table 5 in the current version of C57.16 covers this subject. Is the note sufficient? Input from T.F. members is requested.

2. Discussion took place re the current revision process for IEEE Std. 32-1972 (now IEEE C57.32) and the support to the W.G. to be provided by the Dry Type Reactor T.F. This standard covers neutral grounding devices; including neutral grounding reactors and Peterson coils (resonant neutral grounding). The Dry Type Reactor T.F. provided input to

the revision process when the document was under the jurisdiction of the IEEE Protective Devices Committee. The T.F. will continue to support the revision process and provide input on reactors to the W.G. chaired by Steve Schappell. Pierre Riffon asked the question if neutral grounding reactors should be included in C57.16. Another option is for C57.32 to refer to C57.16 re the test code for neutral grounding reactors. One role of the T.F. could be to ensure that the test code for C57.32 properly reflects the design aspects of the various neutral grounding devices. One big difference between reactors and resistors, for instance, is short circuit withstand. Design focus for neutral grounding resistors is thermal and for neutral grounding capacitors it is voltage. The Dry Type Reactor T.F. will continue to provide input to the W.G. for the revision of IEEE Std. 32 (now IEEE C57.32). Test code for the various devices is the major challenge and adequate consistency is the issue.

3. The T.F. briefly discussed resistors used in filters. What standard covers resistors for this application? Should they be included in some format in the annex of C57.16 covering filter reactors?

The meeting adjourned at 9:15 a.m. The Chairman stated that the issue of resistors used as part of filters would be brought to the attention of the Transformers Committee re action, if any.

7.7.2.3 WG Dry Type Thermal Evaluation C57.12.56/60 Chairman Richard Provost

The working group met in San Diego, CA at the Catamaran Resort Hotel at 9:30 AM on Tuesday, March 9, 2004 with eight members and ten guests present. Three guests requested membership in the working group, and they are welcome.

The Chair reviewed the minutes from the last meeting which were approved as read. The chair next reviewed the Title and Scope of the document which was used for the PAR submission. The PAR was approved at the December 10, 2003 Standards Meeting.

The Title of the document will be: "IEEE Standard Test Procedure for Thermal Evaluation of Insulation Systems for Dry Type Power and Distribution Transformers, Including Ventilated, Solid-Cast and Resin Encapsulated Transformers".

The Scope of the PAR will be worded as follows: This Test Procedure is for the thermal evaluation of insulation systems of dry type power and distribution transformers, including both ventilated technology and solid-cast / encapsulated technology, to be used for determining the temperature classification of the insulation systems.

The Chair then thanked the members of a task force who provided valuable input into the creation of a combined draft document for the combining of IEEE C57.12.56 and IEEE C57.12.60. These members were Derek Foster, Jeewan Puri, Bill Simpson, Rick Marek, Roger Wicks and Dick Provost.

The Chair then discussed a number of issues related to the combined document which came up during the development of the draft document. A summary of these issues will be circulated to members of the working group. The issues discussed will be outlined in turn.

Should the document be a guide or a standard (56 is a standard, 60 a guide). This led to discussion related to what is needed to be a standard (typically a lot of data/experience). The chair will discuss this with IEEE to determine how we should proceed. This then led to a solicitation for data from members of the working group and Ken McKinney volunteered to help coordinate collection of this information.

During a discussion on the various sections, it became apparent that better "definitions" of the equipment types are needed for the combined document, and that within this definition there should be a listing of the various technologies used to produce each type so as to not limit the scope covered. Martin Navarro agreed to provide a draft definition which the chair agreed to incorporate into the draft document which will be circulated to members of the working group.

The Chair then discussed winding type specifications for the models which raised a substantial amount of discussion. It was generally agreed that this was a good upgrade, and that the specifics of the wire sizes/configurations would be part of the draft document which would be commented on by members of the working group as a part of their review.

The review of the draft document in the meeting covered sections up through and including Clause 4.2, and it is expected that the remainder of the document will be reviewed during the next meeting along with any additional comments developed during the circulation of the new draft.

New Business – Rick Marek raised a question to the floor regarding the overall design of the test coils relative to the low voltage and high-low barrier portions of the transformers and how they need to be tested, since the existing documents and this current draft document deal with the aging and testing of the high voltage windings. The Chair raised the further question regarding a number of issues which have come up due to the combination of the two documents, which led to a question regarding the viability of combining these two documents.

The Chair agreed to circulate a questionnaire along with the draft document to the working group members to solicit comments related to these issues.

There being no other new business, the working group adjourned at 10:45 AM

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

1 The working group met at 1:45 pm with 11 members and 7 guests present.

2 After introductions the minutes from the October 7, 2003 meeting in Pittsburgh were approved as written.

3 Old Business

The Chairman led a discussion of the various clauses of the standard objected to by Nigel McQuin during the last ballot. Nigel McQuin was not present for the meeting, neither was Max Cambre who provided a very thorough review of Nigel's objections prior to the meeting in Raleigh, in the spring of 2003. Joe Cultrera and Jerry Murphy provided written reviews of the clauses on resistance measurements. Jerry Murphy and Patrick Epping

provided written reviews of clauses on dielectric tests. The Chairman provided a compiled listing of the comments from the volunteers. The meeting consisted of reviewing these comments by clause numbers.

It was suggested that a par be initiated for a complete review of the standard prior to the expiration date of the standard; i.e., Jan 2006. Eight of the 18 persons present were in favor of a complete review of the document as opposed to a corrigenda, which would address only certain clauses.

The following clauses were reviewed during the meeting:

5.4.1 5.4.2 5.4.2.1 5.4.2.2 5.4.2.3 5.4.2.4

5.4.2.5 10.2 10.8.2 10.8.3

Clauses 10.9.4 b), 11.2, 11.3, 11.5, and 11.8.6 were not reviewed for lack of time.

The Chairman will provide a document for review by the members of the working group before the next meeting, which will incorporate the changes proposed by Mr. McQuin as summarized by the Chairman. A vote, at or before the next meeting, will determine if these changes should be incorporated in the document. When it is determined which, if any, of Nigel McQuin's objections the working group wishes to incorporate into the standard, the working group will be in a better position to decide if a complete revision or a corrigenda is more appropriate.

4 There being no new business, the meeting was adjourned at 3:05 pm.

7.7.3 Administrative

If a standard is at the end of life, either reaffirm or take out a PAR. The Standards Board will extend the life of the standard to the end of the PAR.

7.7.4 New Business

1 C57.12.50/51/52 and 55 have been transferred from NEMA to IEEE effective December 2, 2002. The Subcommittee has 5 years from the transfer date to revise the standards as there is no reaffirmation process. Only a PDF version of the documents is available for revision. Discussion ensued on the problems when documents are scanned then converted to PDF requiring retyping the entire document and errors in electronic standards received from IEEE due to software conversions. It was questioned why IEEE could not provide the standards in WORD format and noted that the Transformer Committee now has several representatives on the Standards Board who are aware of and will address the issue.

2 C57.96 Loading Guide was reaffirmed February 2004.

3 IEEE 259 Evaluation of Insulation Systems for Specialty Transformers ballot approved the reaffirmation.

4 There being no further business, the subcommittee meeting adjourned at 2:15 PM.