IEEE/PES TRANSFORMERS COMMITTEE MEETING  
Jackson, MS, USA  
March 13-17, 2005  

ATTENDANCE SUMMARY  

MEMBERS AND GUESTS REGISTERED FOR TRANSFORMER COMMITTEE MEETING:  

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ATTENDEES TO THE MAIN COMMITTEE MEETING, MARCH 17, 2005:

Due to the fact that one of the four attendance rosters was not returned we do not have a record of attendance for the Main Committee Meeting.
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1.0 Chair’s Report, Remarks & Announcements – K.S. Hanus

Chairman Ken Hanus called the meeting to order at 8:00 A.M. As there were no changes requested, the Agenda as published was generally followed. All Meeting participants are encouraged to work towards full membership in the Main Committee. Application forms and membership requirements can be found in the Committee Operations & Procedures (O&P) Manual, accessible on the Committee website (http://www.transformerscommittee.org/). Applications can be forwarded to the Secretary at any time, for action at the next Administrative SC Meeting. Mr. Hanus opened the meeting by covering a few announcements, including several items covered in more detail in the Administrative SC Minutes in Section 3.

- New Transformer Committee Members

Chairman Hanus introduced the following new members of the transformer committee:

- Giuseppe Termini  PECO Energy  User
- Ed teNyenhuis  ABB Inc.  Producer
- Thomas W. Bassett  Power Equipment Specialists  Producer
- Thomas W. Spitzer  TXU Electric Delivery  User
- Roger Verdolin  SNC Lavalin ATP  User
- John Crotty  San Diego Gas& Electric  User

2.0 Approval of Minutes from Spring 2005 Meeting – K.S. Hanus

Chair asked that a motion be made to approve the minutes of the Spring 2005 meeting. A motion was made and seconded to approve the minutes. This is unanimously approved.

3.0 Administrative Subcommittee – Ken Hanus

Chairman Ken Hanus covered the key points of the Administrative Subcommittee Meeting held on March 13, 2005. Full details of the Minutes of the Administrative Subcommittee Meeting Minutes follow.

3.1 Introduction of members and guests

Chairman Hanus called the meeting to order at 2:00 p.m., Sunday, March 13, 2005, at the Hilton Hotel in Jackson, Mississippi. The meeting started with introductions of members and guests.

The following members of the Subcommittee were present:

- Gregory Anderson
- Bill Chiu
- Richard Dudley
- Donald Fallon
- Ramsis Girgis
- Ken Hanus
- Charles Johnson
- Thomas Lundquist
- Carl Niemann
- Don Platts
- Thomas Prevost
- Jeewan Puri
- H. Jin Sim
- James Smith (Jim)
- Loren Wagenaar
- Dan Mulkey
The following members were absent:
   Frank Gryszkiewicz   Steve Antosz   Edward Smith (Ed)

The following guests were present:
   Jodi Haasz
   Ron Stahara (representing Ed Smith, Distribution Transformer Subcommittee)

3.2 Approval of the Jackson meeting minutes

The minutes of the previous Administrative Subcommittee meeting in Las Vegas were approved as written.

3.3 Additions to and/or approval of the agenda

The Agenda provided by the Chair prior to the meeting was approved.

3.4 Meeting Arrangements, Host Reports, and Committee Finances – G.W. Anderson

3.4.1 Meetings Arrangements

The next meeting will be on October 23-27 in the Peabody Hotel in Memphis, Tennessee. This meeting will be hosted by Randy Williams and ABB. There will be three tours: ABB Alamo, Reinhasen and ERMCO. The spring meeting will be on March 19-23. A location was still not certain.

3.4.2 Finances

We took a hit financially in Las Vegas. The balance before the Fall 2004 meeting was $18,062.74. The balance before this meeting is $3,002.58.

3.4.3 AM System

So far we have received positive feedback on the AM system. We still need help to develop the proper reports. Greg was working on the attendance roster sheets.

3.5 IEEE Staff – Jodi Haasz

Jodi Haasz gave a presentation on the IEEE/IEC Dual Logo agreements concentrating on maintenance issues. Jodi presented a flowchart which details the process for revising a Dual-Logo document. A copy of this flowchart will be posted on the transformers committee webpage.

There was discussion in the group about whether the committee should propose additional dual logo documents. Bill Chiu made a motion that no additional documents should be submitted for Dual-Logo status until C57.135 is revised. Jin Sim seconded this motion. After considerable discussion the motion was withdrawn. This will be discussed further in the Standards subcommittee.
3.6 Committee Service Awards – H.J. Sim

Jin indicated that he has five awards to be given at this meeting. Gustav Preininger will be awarded the distinguished service award. Jin encouraged all members to identify retired working group chairs for awards. He also encouraged that members identify committee members deserving awards.

3.7 Chair’s report – K.S. Hanus

Ken stated that he will submit his report to be included in the main committee minutes.

3.8 Vice Chair’s report – D.J. Fallon

Don’s report was distributed prior to this meeting and is included in the main committee minutes. Don noted that we are late in revising the O&P manual. Task for an article submission for Power and Energy Magazine is still pending.

3.9 Secretary’s Report – T.A. Prevost

3.9.1 Membership Review

Voting Members – Six new members were added at the last meeting in Las Vegas:

- Peter Heinzig – Siemens - Producer
- Jack Hammers – Oklahoma Gas & Electric – User
- Jerry Murphy – Reedy Creek Energy Services – User
- Van Nhi Nguyen – Hydro-Quebec – User
- Davis Wallach – Duke Power Company – User
- Steven Schappell – Waukesha Electric Systems – Producer

Welcoming letters will be sent to these new members. Our aim is to encourage active participation in the work of the Committee, and encourage all participants to become members of the Committee.

Committee membership review will take place after we have been satisfied that we have all of the contact information in the new AM system. As reviewed at our last meeting, the classification Corresponding Member needs to be defined in the next update of the Committee O&P Manual. This classification should hold the same status as that of regular Member.

Membership, including changes made at the San Diego meeting now stands at:

<table>
<thead>
<tr>
<th>Classification</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Members</td>
<td>198</td>
</tr>
<tr>
<td>Producers</td>
<td>69</td>
</tr>
<tr>
<td>Users</td>
<td>42</td>
</tr>
<tr>
<td>General</td>
<td>54</td>
</tr>
<tr>
<td>Life Members</td>
<td>11</td>
</tr>
<tr>
<td>Corresponding Members</td>
<td>1</td>
</tr>
<tr>
<td>Emeritus Members</td>
<td>21</td>
</tr>
</tbody>
</table>
The Committee database list has 750 names on it at this time. The database will converted over to the AM system between now and the next meeting. It is expected that this conversion will “cull out” guests who no longer have an interest in attending committee meetings and that the database will have fewer names.

As per a request from the Las Vegas meeting I have sorted the data in the AM system by participant classification.

### COMMITTEE MEMBERS-ACTIVE

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Ratio(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OEM - components, materials, etc.</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>OEM - Other</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>OEM - transformers, instrument transformers, etc.</td>
<td>55</td>
<td></td>
</tr>
<tr>
<td>sub-total</td>
<td>69</td>
<td>41.8</td>
</tr>
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<td>User</td>
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</tr>
<tr>
<td>Industrial/Other</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Utility - investor-owned</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Utility - public-owned</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>sub-total</td>
<td>42</td>
<td>25.5</td>
</tr>
<tr>
<td>General Interest</td>
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<tr>
<td>Academic</td>
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<td></td>
</tr>
<tr>
<td>Association/Professional/Other</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Construction/Service/Testing Company</td>
<td>5</td>
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</tr>
<tr>
<td>Consultant</td>
<td>45</td>
<td></td>
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<tr>
<td>sub-total</td>
<td>54</td>
<td>32.7</td>
</tr>
<tr>
<td>Total</td>
<td>165</td>
<td></td>
</tr>
</tbody>
</table>

### ACTIVE PARTICIPANTS

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Ratio(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Producer</td>
<td></td>
<td></td>
</tr>
<tr>
<td>OEM - components, materials, etc.</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>OEM - Other</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>OEM - transformers, instrument transformers, etc.</td>
<td>106</td>
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<tr>
<td>sub-total</td>
<td>142</td>
<td>58.4</td>
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<tr>
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<td></td>
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<tr>
<td>Industrial/Other</td>
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<td></td>
</tr>
<tr>
<td>Utility - investor-owned</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Utility - public-owned</td>
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<td></td>
</tr>
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<tr>
<td>General Interest</td>
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<td></td>
</tr>
<tr>
<td>Association/Professional/Other</td>
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<td></td>
</tr>
<tr>
<td>Construction/Service/Testing Company</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>Consultant</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>sub-total</td>
<td>55</td>
<td>22.6</td>
</tr>
<tr>
<td>Total</td>
<td>243</td>
<td></td>
</tr>
</tbody>
</table>
### INTERESTED INDIVIDUALS

<table>
<thead>
<tr>
<th>Category</th>
<th>Number</th>
<th>Ratio (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Producer</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OEM - components, materials, etc.</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>OEM - Other</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>OEM - transformers, instrument ...</td>
<td>70</td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>101</td>
<td>57.7</td>
</tr>
<tr>
<td><strong>User</strong></td>
<td></td>
<td></td>
</tr>
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<td>Industrial/Other</td>
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<td></td>
</tr>
<tr>
<td>Utility - investor-owned</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>Utility - public-owned</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>43</td>
<td>24.6</td>
</tr>
<tr>
<td><strong>General Interest</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Academic</td>
<td>3</td>
<td></td>
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<tr>
<td>Association/Professional/Other</td>
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<tr>
<td>Construction/Service/Testing Company</td>
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<td></td>
</tr>
<tr>
<td>Consultant</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td>31</td>
<td>17.7</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>175</td>
<td></td>
</tr>
</tbody>
</table>

#### Interest Category of Transformer Committee

- **Producer**
- **User**
- **General Interest**
3.9.2 New Member Applications

New applications for Committee Membership have been submitted for:

- Giuseppe Termini PECO Energy    User
- Ed teNyenhuis  ABB Inc.    Producer
- Thomas W. Bassett Power Equipment Specialists  Producer
- Thmas W. Spitzer TXU Electric Delivery   User
- Roger Verdolin SNC Lavalin ATP   User

These applications will be reviewed at the Administrative Subcommittee meeting. The Committee welcomes and encourages active participants to become Members of the Committee. Requirements and application forms can be found in the Organization and Procedures (O&P) Manual, accessible on the Committee website. Subcommittee Chairs are encouraged to recommend new members, and to communicate to applicants awareness that Membership is a privilege gained through active participation in Committee work at the WG and SC level. WG and SC Chairs are reminded also that signing an application sponsoring a new member signifies their understanding that the applicant has met the requirement of membership and active participation for at least one year in the WG or SC they Chair. New member applications can be forwarded to the Secretary’s attention at any time for review at the next AdsubCom meeting.

3.9.3 Committee and Subcommittee Directory Rosters

In order to provide indemnification to working group and subcommittee members it is crucial that membership lists be maintained. Fortunately the new AM system should make this simple to administer. It is important that each Subcommittee and working group chair keep the rosters updated so that this information can be provided to the IEEE SA.

3.9.4 Meeting Minutes

The minutes of the Las Vegas Fall 2004 transformers committee meeting were posted to the committee website on Monday March 7, 2005.

The minutes of the Las Vegas Fall 2004 meeting were mailed on March 7, 2005, to those who ordered printed copies during meeting registration. 57 registrants ordered printed copies of the Minutes. The Minutes were reproduced at a cost of $765.39 for 60 copies and postage costs were $319.17 for 57 mailings which averages $5.60 per mailing. The net cost of Minutes printing and mailing was $1084.56 for the Las Vegas Minutes.

The cost of previous minutes were:

- Raleigh (Spring ’03)    $3946.82
- Pittsburgh (Fall ’03)    $714.27
- San Diego (Spring ’04)    $1481.77  (78 @ $13.60 ea. + $357.17 postage)
- Las Vegas (Fall ’04)    $1084.56  (60@ $12.76 ea. + $319.17 postage)

For San Diego the cost per person requesting minutes was $1481.77 / 78= $19.00
For Las Vegas the cost per person requesting minutes was $1084.56 / 60 = $18.08
I recommend that we increase the cost for printed minutes to $20.00.

Subcommittee Chairs are requested to submit their SC Minutes for the Jackson Meeting by June 20, 2005. Minutes should be submitted via e-mail to the Secretary (tprevost@ieee.org), with a copy to Susan McNelly (sjmcnelly@ieee.org) for posting on the Committee website. The submittal should be formatted in Word 2000 (or earlier versions) and it would be appreciated if the Minutes were put in the format as shown in the present assembled Minutes, with numbering as indicated in Main Committee Meeting Agenda. Please indicate total attendance count for each Subcommittee, Working Group, and Task Force meeting in your Minutes. Please do not send a copy of the attendance listing for this attendance count. If a SC Vice-Chair, Secretary, or other SC member is preparing the SC Minutes, please let them know these details about Minutes submittals.

3.10 Standards Subcommittee – B. Chiu

3.10.1 Standards and coordination activities
Bill Chiu reviewed his report, which is included in the Committee meeting minutes.

3.10.2 Documents submitted to the Standards Board
See the standards status report in Attachment 1, presently posted on the website and planned for inclusion at the end of the assembled Committee Minutes.

1. Meeting Attendance
   a. The Standards Subcommittee met on Wednesday, March 16, 2005, at 4:30 PM. There were 15 members and 21 guests present.

2. Approval of previous meeting minutes
   a. The meeting minutes from the Fall, 2004 meeting in Las Vegas was approved as written.

3. Working Group Report
   a. Continuous Revision of C57.12.00 & C57.12.90 – Subhash Tuli, WG Chair
      i. Draft 3 of the documents are being developed to addressed the many comments and negatives on metrification received from the D2 ballot in 2002.
      ii. Subhash made a commitment to complete the required work on both PC57.12.00 and PC57.12.90 for recirculation ballot submittal prior to the next meeting in Memphis, TN.
      iii. Due to the time lapse since the D2 ballot, arrangements are being made with IEEE SA staff to update the email address list of the D2 ballot pool.
   b. C57.12.80 – Terminology for Power & Distribution Transformers – Tim Raymond, WG Chair
      i. Work is currently underway to pursue an amendment to C57.12.80-2002 in order incorporate the new definition of thermally-upgraded paper. A PAR for amendment will need to request from IEEE SA. Mr. Raymond will pursue obtaining the PAR.
   i. Bill Chiu provided status update on Wally Binder’s behalf. The reaffirmation package has been submitted to RevCom for approval. Result is expected in the March, 2005 Standards Board meeting. All indications are the reaffirmation will be approved.

4. Old Business

a. IEEE/IEC Dual Logo
   IEEE C57.135 / IEC 62032 Guide for Application, Testing, Installation and Operation of Phase Shifting Transformers – Approved in December, 2004

b. Future IEEE IEC Dual Logo candidates – See attached list.
   While there were some discussions on the standards listed in the attached list. There were no changes made. Bill Chiu announced a decision made from the AdCom meeting not to pursue any immediate dual logo standards until some outstanding issues on maintenance of these dual logo standards.

c. NEMA Standards – Status update on obtaining electronic copies of the NEMA documents
   i. These NEMA standards are no longer available in the original Word format. Other method such as AdobeAcrobat will help in reducing the amount of retyping.

d. TF on IEC/IEEE Cross Reference - IEC TC10, TC14, TC36 and TC98 – Steve Beckman, TF Chair
   i. The objective of the TF is to provide a cross reference of IEEE/IEC Standards - IEC TC10, TC14, TC36 and TC98 and the IEEE C57 series
      Task Force Chair contact info:
      Stephen Beckman
      beckmansa@ieee.org
   ii. The current available references are:
      1. Excel Spreadsheet from IEEE
      2. PDF file from Jin Sim on the comparison of requirements (dated back in 1998)

e. C57.12.00 Section Reference – Don Platts
   i. Don Platts presented a list of major clauses in C57.12.00 with responsible subcommittee based on Bill Chiu and Subbash Tuli’s initial input. Bill Chiu will take the action item of sending out the list to all of the subcommittee chairs for review and comment.
5. New Business
   a. C57.12.00 and C57.12.90 Continuous Revision Discussion
      The continuous revision process so far has not been successful due to the
      lengthy delays caused by the metrification issues and the round-trip
      conversions between Word and FrameMaker.

   b. Formation of New WG for C57.12.00.
      The subcommittee chair discussed the challenges of a combined working
      group to coordinate all of the C57.12.00 and C57.12.90 revisions. The large
      amount of work in resolving the negative ballots from these two documents
      will be overwhelming for just one working group to handle. A proposal was
      made at AdCom to split up this working group into two separate working
      group; this proposal was approved by the AdCom pending the selection of the
      working group chair. Effective on January 1, 2006, two separate working
      group will be formed to address C57.12.00 and C57.12.90.

   c. New CD Collection on the C57 series
      i. G. Anderson brought up the subject of requesting an updated C57
         series CD collection from IEEE. The discussion centered around the
         timing of these standards. General consensus was that we wait until
         several of the key standards have completed their revision and
         development. Example of these will include C57.12.00, C57.12.90,
         and C57.104, C57.143.

      ii. The subcommittee chair requested a volunteered to coordinate this
          effort with IEEE SA. G. Anderson accepted the action of coordinating
          with IEEE to determine the best timing for the next publication of a CD
          collection.

   d. References to safety related industry standards.
      i. Mr. Kipp Yule raised a concern on the need to reference industry
         standards on arc flash analysis, protective clothing, thermal approach
         boundary, and safety approach distance. These publications could
         include NEC 2005, IEEE 1584, NFPA 70E to name a few. Mr. Kipp
         Yule was requested to provide a listing of these publications to the
         subcommittee chair.

6. Adjournment
   a. The meeting adjourned around 5:30PM.

3.11 Round-Table: Subcommittee Activities - Subcommittee Chairs

3.11.1 Distribution Transformers – Ed Smith
Nothing to Report.

3.11.2 Bushings - F. E. Elliott
No report.
3.11.3 HVDC Converter Transformers & Smoothing Reactors - Richard Dudley
Nothing to report.

3.11.4 Dry-Type Transformers – Chuck Johnson
Nothing to report.

3.11.5 Instrument Transformers - J. E. Smith
Nothing to report.

3.11.6 Performance Characteristics – R. S. Girgis
Nothing to report.

3.11.7 Meetings & Planning - Greg Anderson
Anyone who will be coming to the transformers committee meeting must register, even if they
only plan to attend one WG meeting.

3.11.8 Dielectric Tests - L. B. Wagenaar
3.11.8.1 Mark Perkins will resign as WG Chair of Low Frequency Dielectric Tests. Bertrand Poulin will take over as chair.
3.11.8.2 There is no need for a liaison with Performance Characteristics for the WG on Frequency Response Analysis.

3.11.9 Audible Sound and Vibration – Jeewan Puri
No report.

3.11.10 Underground Transformers and Network Protectors – C. Niemann
Nothing to report.

3.11.11 Insulating Fluids – F. J. Gryszkiewicz
Nothing to report.

3.11.12 Insulation Life – D. W. Platts
Nothing to report.

3.11.13 Power Transformers - E.G. Hager
Nothing to report.

3.12 Old Business

3.12.1 Minutes marked as “unapproved”. Don Fallon is checking on the proper format for meeting minutes.

3.13 New Business

3.13.1 Vice Chair or Co-Chair
After discussion it was decided that co-chairs will be allowed at the WG level. For subcommittees there needs to be a chair and a vice Chair is allowed.

3.13.2 Guides – Don Platts
Don commented that he has disapproved several ballots lately because guides do not provide enough “guidance”. He feels this needs to be addressed.
13.13.3 C57.12.00 and C57.12.90 – Don Platts
Don suggested that due to the importance of these documents that we provide more time and effort to handle the negativates and comments from the ballots.

13.13.4 Coordination of Gas Guide and Loading Guide- Don Fallon
Jerry Corkran has submitted documentation and test data that shows that coordination is needed between C57.104 (Gas Guide) and C57.91 (Loading Guide). After discussion it was decided that this needs to be addressed at the WG level.

3.14 Adjournment
Chairman Hanus adjourned the meeting at 5:32 p.m.

Respectfully submitted,
T.A. Prevost, Secretary

4.0 Vice Chair’s Report – D. J. Fallon
The following items report on activities of PES Committees on which the Vice Chair serves as Committee representative. There has been no general meeting since our Las Vegas Fall 2004 meeting. For the first time, rather than holding a January meeting of the Technical Committee Program Chairs (TCPC’s) in Chicago to plan and schedule the technical program for the summer IEEE/PES General Meeting, this process was performed entirely through on-line scheduling tools and via e-mail.

4.1 PES General Meeting in San Francisco - Technical Session Tracks
The IEEE Power Engineering Society (PES) 2005 General Meeting will be held at the Hilton San Francisco Hotel in San Francisco CA from June 12-16, 2005. Borrowing from information on the IEEE/PES website (http://www.ieee.org/portal/site/pes/) - Focusing on major topics concerning the power industry in today’s unpredictable world, the 2005 PES General Meeting will address numerous aspects of vital importance and of interest worldwide to practicing engineers, management personnel from manufacturers, utilities and other areas of the industry, as well as academics, researchers and the non-technical professionals with whom we share our field. During approximately 100 technical sessions, many topics will be closely examined and discussed, including:

- Understanding and Responding to System-Wide Events
- Securing New Sources of Energy
- Improving Reliability and Power Quality
- Using Innovative Measurement
- Surviving New Markets and New Structures

The theme of the meeting is “Leading the Way in Uncertain Times.”

The preferential topics for the technical sessions are as follows:

Track 1: Understanding and Responding to System-Wide Events, covering such topics as:
- The Northeast Blackout of August 2003
• Physical and cyber security concerns
• Line loading, interconnect issues, IPPs
• Operating strategies under reduced generation availability (extreme contingencies)
• Releasing excess capacity through VAR control

**Track 2: Securing New Sources of Energy**, covering such topics as:
• Inherently safe nuclear reactors, clean coal technologies, gas turbine peaking units
• Solar, wind, tidal, geothermal, biomass, fuel cells
• Dispersed generation

**Track 3: Improving Reliability and Power Quality**, covering such topics as:
• Power electronic switching (sub-cycle source transfer, plant-wide UPS units)
• Super-conducting energy storage
• Advances in SCADA systems (closed loop systems, advanced communications)

**Track 4: Using Innovative Measurement and Control Techniques to Improve Customer Service**, covering such topics as:
• Advanced protection algorithms, system modeling, economic dispatch
• Fault locating, down conductor detection
• Optical sensing, non-standard instrument transformers

**Track 5: Surviving New Markets and New Structures**, covering such topics as:
• Software tools (load flow, fault analysis, risk assessment, economic analysis)
• Bundled services and other new post-deregulation economic models
• Improving power engineering education

### 4.2 Technical Paper Sessions

#### 4.2.1 Technical Paper Session at the 2005 General Meeting

One technical session sponsored by the Transformers Committee is planned with 5 Proceedings papers to be presented during the IEEE/PES 2005 General Meeting in San Francisco. The session is presently scheduled as follows:

**Transformers I - Condition Assessment & Analysis Methodologies (paper session)**
Wednesday, 15 June 8:00 AM-11:00 AM (aligned to Track 1 - Understanding and Responding to System-Wide Events Track)

- “Transfer Function Analysis Using STFT for Improvement of the Fault Detection Sensitivity in Transformer Impulse Test” (05GM0230) by E. AL-AMMAR and G. KARADY
- “Transformer Test to Calculate Z0 for Interconnected Windings Transformers Using Symmetrical Sequence Components” (05GM0335) by G. ROSSELLI
- “Diagnosis of Power Transformers Using Modified Self Organizing Map” (05GM0434) by A. OZDEMR, C. SINGH, J. LIM, J. LEE, P. JI and S. KIM
- “A Transformer Condition Assessment Framework Based On Data Mining” (05GM0250) by J. YUAN, L. WU, X. LI and Y. ZHU
- “Impact of the Condition of Oil on the Polarisation based Diagnostics for Assessing the Condition of Transformers Insulation” (05GM0426) by P. PURKAIT and T. SAHA
4.2.2 2005 IEEE/PES T&D CONFERENCE AND EXPOSITION

Planning is underway for the technical program for the 2005 T&D Conference and Exposition (October 9-12, 2005) in New Orleans. The deadline for submission of Proceedings and Panel Papers to the review website is April 12, 2005. See http://www.ieee-t-d.org/call.html for more information. A suggested Panel Session on Natural Ester Dielectric Fluids will be reviewed with the Conference Technical Program Chair for possible inclusion in the program.

4.3 Committee Organization and Procedures Manual

The Transformers Committee O&P Manual revision is currently in process.

4.4 Power & Energy Magazine Submission

The Transformers Committee was scheduled to contribute an article to Power & Energy Magazine for publication last year, but other priorities have prevented this work. The format and content is at the discretion of the Committee. The Vice Chair will be looking for assistance in preparation of a submittal to P&E Magazine.

Respectfully submitted, D. J. Fallon, Vice Chair

5.0 Special Presentation on “My Ballot System” – C. Sahr

Christine Sahr from IEEE staff gave the membership a special presentation on “My Ballot System”

6.0 Transformer Standards

Standards Activities Since the October, 2004 Meeting – B. Chiu

TRANSFORMERS STANDARDS STATUS


The report is a list of all the transformer related standards under the sponsorship of IEEE Power Engineering Society Transformers Committee (IEEE PE/TR). The standards are grouped by Subcommittees and sorted by document numbers. The report also contains the active PARs under the responsible Subcommittee. The standards that are not yet assigned to a subcommittee are temporarily listed under the Standards Subcommittee.

IEEE/IEC DUAL LOGO STANDARDS

IEEE Std C57.153-2001 Guide for the Guide for the Application, Specification, and Testing of Phase-Shifting Transformers has been approved by the IEC TC 14 as of December, 2004. The corresponding IEC document number is:

DOCUMENTS PROCESSED BY THE IEEE STANDARDS BOARD

The following sections list all of the documents submitted to the New Standards Committee (NesCom) and the Standards Review Committee (RevCom) of the Standards Board since the October, 2004.

NEW STANDARDS COMMITTEE (NesCom)
EXISTING PARS – EXTENSION & MODIFICATION
Recommendation: Approve target extension request until December 2006. (12/7/04)

PC57.19.00 (PE/TR) Standard General Requirements and Test Procedure for Power Apparatus Bushings
Recommendation: Approve target extension request until December 2005. (12/7/04)

NEW PARS - REVISIONS OF EXISTING STANDARDS
PC57.110 (PE/TR) Recommended Practice for Establishing Liquid-Filled and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents (Deferred from the September 2004 NesCom meeting)

NEW PARS - NEW STANDARDS
PC57.150 (PE/TR) Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or larger

ADMINISTRATIVELY WITHDRAWN PARS
PC57.12.25 (PE/TR) Standard for Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage, 34500 GrdY/19920 Volts and Below, Low Voltage, 240/120 Volts; 167 kVA and Smaller - Requirements
Recommendation: Approve administrative withdrawal. (12/7/04)

Recommendation: Approve administrative withdrawal. (12/7/04)

PC57.145 (PE/TR) Guide for the Definition of Thermal Duplicate Liquid-Immersed Distribution, Power, and Regulating Transformers
Recommendation: Approve administrative withdrawal. (12/7/04)

STANDARDS REVIEW COMMITTEE (RevCom)

NEW & REVISED STANDARDS
PC57.19.00/D6.1 (PE/TR) Standard General Requirements and Test Procedure for Power Apparatus Bushings
Recommendation: APPROVE (12/7/2004)

5-YEAR REVIEW
Sponsor requests an extension to determine whether to revise or reaffirm the standard.

C57.105-1978 (R1999) IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems
Sponsor requests an extension to determine whether to revise or reaffirm the standard.

Sponsor requests an extension to determine whether to revise or reaffirm the standard.

Sponsor requests an extension to determine whether to revise or reaffirm the standard.

1276-1997 IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Power Transformers
Sponsor states that a reaffirmation ballot is in progress.

Sponsor has submitted a PAR extension request to NesCom for revision project PC57.15.
Recommendation: Extend until the expiration of the PAR for PC57.15 [December 2006].

Sponsor has submitted a PAR for revision to NesCom.
Recommendation: Extend until the expiration of the PAR for PC57.100 [December 2008].

C57.121-1998 IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers
Sponsor states that a reaffirmation ballot is in progress.

C57.138-1998 IEEE Recommended Practice for Routine Impulse Test for Distribution Transformers
Sponsor states that a reaffirmation ballot is in progress.

PARS DUE TO EXPIRE AT THE END OF 2005

PC57.12.00 IEEE Standard General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers
If the projects will not be submitted to RevCom in time for the December 2005 meeting, you have the following options:

1. Request an extension for the projects. The Target Extension Request Form can be found at http://standards.ieee.org/guides/par/extension.rtf. Please note that this extension request can now be from one to four years.
2. Request withdrawal of the projects.

If there is no response by 17 October 2005, the projects will be recommended for administrative withdrawn at the 6 December 2005 IEEE-SA Standards Board meeting.

STANDARDS DUE TO EXPIRE AT THE END OF 2005

IEEE 638  IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations
IEEE 1276  IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Power Transformers
IEEE 1277  IEEE General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission
IEEE 1388  IEEE Standard for the Electronic Reporting of Transformer Test Data
IEEE Standard General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers

IEEE Standard General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and/or Resin Encapsulated Windings

Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller, High-Voltage 34 500 Volts and Below; Low-Voltage, 7970/13 800 Y Volts and Below

Standard for Requirements for Secondary Network Transformers - Subway and Vault Types (Liquid Immersed)

IEEE Standard Terminal Markings and Connections for Distribution and Power Transformers


IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings

IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers

IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers

IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems

IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration

IEEE Guide for Transformers Directly Connected to Generators

IEEE Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems

IEEE Loss Evaluation Guide for Power Transformers and Reactors

IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers

IEEE Guide for Failure Investigation, Documentation, and Analysis for Power Transformers and Shunt Reactors

IEEE Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers

IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers

IEEE Guide for Sound Level Abatement and Determination for Liquid-Immersed Power Transformers and Shunt Reactors Rated Over 500 kVA

IEEE Recommended Practice for Routine Impulse Test for Distribution Transformers
### Expiration Projection for Existing Standards

![Expiration Projection for Existing Standards]


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<tr>
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**Expiration Projection for Existing Standards**

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## 2005 STANDARDS BOARD MEETINGS SCHEDULE AND SUBMITTAL DEADLINES

### Meeting Dates

<table>
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### Deadline for Submittal of PAR (1) or Draft Standard (2)

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1) A PAR must be sent to the Standards Subcommittee Chair before the stated deadline.

2) Standards must be submitted directly to the IEEE Standards Department by the Working Group Chair before the stated deadline to be considered at the next Standards board Meeting.


CURRENT LIST OF ALL OPEN STANDARDS PROJECT (FROM IEEE Website 02/12/2005)
http://standards.ieee.org/board/nes/C2-C136.html
Only PARs submitted electronically and approved since the December 1998 Standards Board meeting are listed

**PC57.12.00** (PE/TR) Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

**PC57.12.01** (PE/TR) Standard General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and/or Resin Encapsulated Windings

**PC57.12.10** (PE/TR) Standard Requirements for Liquid-Immersed Power Transformers

**PC57.12.20** (PE/TR) Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller: High Voltage, 34500 Volts and Below; Low Voltage, 7970/13800Y Volts and Below

**PC57.12.28** (PE/TR) Standard for Pad Mounted Equipment - Enclosure Integrity

**PC57.12.29** (PE/TR) Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments

**PC57.12.36** (PE/TR) Standard Requirements for Liquid-Immersed Distribution Substation Transformers

**PC57.12.37** (PE/TR) Standard for the Electronic Reporting of Distribution Transformer Test Data

**PC57.12.40** (PE/TR) Requirements for Secondary Network Transformers, Subway and Vault Types (Liquid-Immersed)

**PC57.12.44** (PE/TR) Standard Requirements for Secondary Network Protectors

**PC57.12.60** (PE/TR) Standard Test Procedure for Thermal Evaluation of Insulation Systems for Dry Type Power and Distribution Transformers, Including Ventilated, Solid-Cast and Resin Encapsulated Transformers

**PC57.12.80** (PE/TR) Standard Terminology for Power and Distribution Transformers


**PC57.13** (PE/TR) Standard Requirements for Instrument Transformers

**PC57.13.1** (PE/PSR) Guide for Field Testing of Relaying Current Transformers

**PC57.13.2** (PE/TR) Conformance Test Procedure for Instrument Transformers

**PC57.13.3** (PE/PSR) Guide for Grounding of Instrument Transformer Secondary Circuits and Cases

**PC57.13.6** (PE/TR) Standard for High Accuracy Instrument Transformers

**PC57.15** (PE/TR) Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators
PC57.19.03-1996/Cor 1-20xx (PE/TR) Standard Requirements, Terminology, and Test Code for Bushings for DC Applications - Corrigendum 1

PC57.21 (PE/TR) Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA

PC57.32 (PE/TR) Standard Requirements, Terminology and Test Procedures for Neutral Grounding Devices

PC57.93 (PE/TR) Guide for Installation of Liquid-Immersed Power Transformers

PC57.98 (PE/TR) Guide for Transformer Impulse Tests

PC57.100 (PE/TR) Standard Test Procedure for Thermal Evaluation of Insulation Systems for Liquid-Immersed Distribution and Power Transformers

PC57.104 (PE/TR) Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers

PC57.106 (PE/TR) Guide for Acceptance and Maintenance of Insulating Oil in Equipment

PC57.110 (PE/TR) Recommended Practice for Establishing Liquid-Filled and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents

PC57.119 (PE/TR) Recommended Practice for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Rating

PC57.127 (PE/TR) Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors

PC57.129 (PE/TR) Standard for General Requirements and Test Code for Oil-Immersed HVDC Converter Transformers

PC57.130 (PE/TR) IEEE Trial-Use Guide for the Use of Dissolved Gas Analysis During Factory Temperature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors

PC57.131 (PE/TR) Standard Requirements for Tap Changers

PC57.139 (PE/TR) Guide for Dissolved Gas Analysis in Transformer Load Tap Changers

PC57.140 (PE/TR) Evaluation and Reconditioning of Liquid Immersed Power Transformers

PC57.142 (PE/TR) A Guide To Describe The Occurrence And Mitigation Of Switching Transients Induced By Transformer-Breaker Interaction

PC57.143 (PE/TR) Guide for Application of Monitoring to Liquid-Immersed Transformers and Components

PC57.146 (PE/TR) Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers

PC57.147 (PE/TR) Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers

PC57.148 (PE/TR) Standard for Control Cabinets for Power Transformers
7.0 Recognition and Awards – Chair: H. Jin Sim

7.1 Certificates of Appreciation

Certificates of Appreciation have been obtained for the following persons:

<table>
<thead>
<tr>
<th>Name</th>
<th>Service Rendered</th>
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<tbody>
<tr>
<td>Andy Speegle</td>
<td>Host, Spring 2005 Meeting, Jackson, MS</td>
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<tr>
<td>Barry Beaster</td>
<td>Certificate of Appreciation, Editor, Chair, Working Group on Definition of Thermal Duplicate</td>
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<tr>
<td>Butch Robinson</td>
<td>Certificate of Appreciation, Chair, Working Group C57.12.57, Dry-Type Network Transformers</td>
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<tr>
<td>Red Hager</td>
<td>Certificate of Appreciation, Chair of the Power Transformers Subcommittee</td>
</tr>
<tr>
<td>Gustav Preininger</td>
<td>Certification of Appreciation, Distinguished Service Award</td>
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7.2 Nominations for IEEE, PES, and Technical Council Awards

None at this time.

7.3 Awards – General

The following is a listing of various awards available. Detailed current information and nomination forms are available from the PES website.

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<tr>
<td>PES Working Group Award (Technical Report)</td>
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<td>“High Interest” Paper</td>
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<td>Alfred Nobel Intersociety Award</td>
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*** Will be decided later. Most of these are annual awards and we can submit the nominations throughout the year.

H. Jin Sim, Chair
Awards Subcommittee
8.0 Report of Technical Subcommittees

8.1 Dry Type Transformers SC - Chairman C. W. Johnson, Jr.

8.1.1 Introductions and Approval of Minutes

The Dry Type Transformer Subcommittee met in Jackson, MS on March 16, 2005 with 16 members and 6 guests present; 1 guest requested membership. Introductions were made and the attendance roster was circulated. Minutes from the October 8, 2003 meeting were reviewed and approved.

Prior to any other activities, IEEE patent policy was discussed. Attendees were asked if they know of any patents that were essential to the implementation of any of the standards related topics under current control of the subcommittee. None were noted.

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

8.1.2 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:

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

1. The working group met at 3:15 pm with 13 members and 4 guests present.

2. There were no comments regarding the minutes from the October 26, 2004 meeting in Las Vegas.

3. The Chairman reviewed the IEEE information on patents and asked if anyone present had any reason to believe the work we were assigned would have any patent implications.

4. Old Business

At the last meeting the Chairman presented a voting form for members to vote to either revise or to leave as written, the various clauses of the standard objected to by Nigel McQuin during the last ballot. Seven members returned completed voting forms. The results of members’ votes were presented during the meeting.

Also included on the voting form was a question to be answered as to whether the member desires to have a PAR initiated for complete review of the standard. The voting form replies were inconclusive on this question, but by a show of hands during the meeting, it was decided not to review the complete standard but to amend only parts of the standard.

Since Nigel McQuin’s original negative ballot, he has agreed to withdraw some of his objections completely and to withdraw others subject to minor changes. These minor changes will be dealt with in the forthcoming amendment.
The clause of the standard relating to resistance measurements, where Nigel McQuin had made a number of comments, was considered by the members to require revision and volunteers were requested to review this section. Three members, Jerry Murphy, Carl Bush and Chuck Johnson agreed to undertake this task. The section of the liquid filled transformer test code relating to resistance measurement is also being reviewed at this time and the Chairman will liaise with the liquid filled test code working group to obtain input which may be useful and to maintain consistency with this test code.

It was agreed to also review various clauses of section 10 (Dielectric tests) and section 11 (Temperature test) during the amendment process.

Jeewan Puri has submitted a copy of the re-write of Clause 13 of C57.12.90, on sound level measurement with a view to also include this in C57.12.91. The Chairman sent this to the members for review and comment. No comments have so far been received so this section will also be reviewed during the amendment process.

Bill Chiu had advised that the expiration date of this standard is December 31, 2006. A PAR for an amendment will be prepared and submitted immediately.

5. There being no new business, the meeting was adjourned at 4:30 pm.

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

The working group met in Jackson, MS at the Jackson Hilton at 9:30 AM on Tuesday, March 15, 2005 with 13 members and 8 guests present. Attendees introduced themselves and signed a roster.

The 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 briefly discussed the definitions provided by Martin Navarro, and it was agreed to form a task force of J. Puri, D. Patel and T. Jonatti to provide simplified definitions for types of dry-type transformers covered under this document. These definitions will be used to guide the work in this document, but may ultimately be forwarded to C57.12.01 or C57.12.80. These definitions may cover the purpose for the different winding types (in a non-commercial manner).

The working group then discussed the models required for this combined document, and a task force of J. Puri, C. Johnson and D. Foster agreed to take input from the two original documents and other sources (such as HV-1, HV-2, HV-3) to propose simplified models the types of dry-type transformers covered under this document. This proposal will cover the principles for developing the model, and potential examples which meet the principles.

The working group felt that there definitely is a need for both full coil and simplified model testing, as each offers advantages. The full coils represent the best simulation of the actual transformer, but as only a small number of coils are built, this can create statistical issues; whereas the models can be built in larger quantities that provide better statistical analysis.
Finally, we discussed the test methods, and agreed that a small group of folks (M. Haas, R. Marek, R. Provost and W. Simpson) will look at these methods and make a proposal for the next meeting. As an example, the current draft only requires cold shock for solid-cast and resin encapsulated coils, and it should likely be included for all dry-type transformers covered under this document.

Chuck Johnson noted that the PAR date for this document runs through the end of 2007. The Chair noted a conflict with the next meeting date, and John Sullivan agreed to swap times. The Chair will contact Greg Anderson to have the swap done for this next meeting only and send information to all parties once completed.

Meeting adjourned at 10:50AM.

8.1.2.3 Dry Type Reactor TF

The Dry Type Reactors T.F. met in the Amphitheater Meeting Room of the Hilton Jackson Hotel in Jackson, Mississippi on Mar. 14, 2005 at 8:00 a.m. There were 10 members and 3 guests present. The following are the highlights of the meeting.

1. The minutes of the Dry Type Reactors T.F. meeting in Las Vegas were approved.

   NOTE: The minutes of the Jackson meeting of the T.F. will not be approved until the meeting in Memphis, Tennessee.

2. IEEE patent policy was reviewed; details on the IEEE Transformers Committee website. Attendees were asked if they knew of any patents that were essential to the implementation of any of the standards related topics under current consideration by the T.F. None were noted.

3. Input, re sound generation and measurement for dry type reactors, provided by RFD to the W.G. producing the IEEE sound measurement guide was discussed. The section covering sound generation in dry-type air-core reactors was deemed satisfactory. The section covering 60 Hz to 50 Hz conversion of sound measurements could be improved; review section on sound measurement in IEEE C57.12.00, include 50 Hz to 60 Hz conversion of sound measurements (Lars-Erik Juhlin will provide some background information; including information submitted by Ramsis Girgis during the revision of IEEE C57.12.00 and IEEE C57.12.90), add a NOTE stressing that the “breathing mode” resonance should be verified to be sufficiently far away from the 120 Hz and 100 Hz mechanical forcing functions.

4. Proposed revisions to IEEE C57.16 were discussed. The following are the important aspects / considerations.

   (i) The concept of reduced BIL in Table 5 was reviewed. It was deemed appropriate based on utility insulation co-ordination and protection practice. Reduced BILs have been eliminated from the dielectric test level table in the revision of IEEE C57.21 now in process due to the dominance of the switching duty seen by SRs. A NOTE will be added to Table 5 stating that terminal-to-terminal BIL may be different from terminal to ground. A clause to this effect, including background information, will be added at a suitable location in the text of the standard. Table 5 content will also be co-coordinated with work being
carried out in Phil Hopkinson’s W.G.; BIL and dielectric test levels for power transformers.

(ii) Pierre Riffon produced a revised draft of the proposed annex on circuit breaker TRV issues associated with the application of series reactors. This revised draft was discussed at length and the following are the highlights.

- Consistency / compatibility between IEEE and IEC re CB classification has now been achieved; IEEE indoor vs. IEC cable systems and IEEE outdoor vs. IEC overhead line systems. The appropriate IEC documents will be referenced. The CB S.C. of the IEEE Switchgear Committee will essentially adopt the IEC performance rationale and terminology.

- IEEE C37.06 (preferred ratings of CBs) currently in the revision process will utilize IEC CB application criteria to define CBs for cable systems and overhead line systems.

- RFD will make editorial corrections to Pierre Riffon’s draft and then send by e-mail to T.F. members; it will be designated Draft #2.

- The addition of capacitance, in shunt or across the reactor, may not be sufficient to ensure that the TRV is within the CB capability. Damping may have to be added to reduce the TRV peak if the Q factor of the reactor at the TRV frequency is not low enough. High frequency Q of the reactor is important.

- Pierre Riffon will send Draft #2 to the Chairman of IEC WG 35 of SC 17A for his comments. Draft #2 should also be forwarded to the CB S.C. of the IEEE Switchgear Committee. Pierre Riffon will coordinate this.

5. Terminal temperature rise limits in IEEE C57.16 should be consistent with limits in IEC 694; temperature rise limits are a function of plating material, if used. Terminal preparation (contact aids) / connection practice is very important. It is preferable if terminal connection configuration is included as part of the temperature rise test so an accurate assessment of expected in-service terminal temperature rise can be made.

6. Sound measurement methodology should be modified to reflect the common use of integrating sound level meters.

7. Impulse test code should be revised to reflect the current standard practice of employing digital impulse test systems.

8. The methodology of the temperature rise design test will be revised to reflect the increasing use of fibre optic based temperature measurement systems. Other methods of temperature determination will be retained; thermometers, thermocouples, etc.

9. Average temperature rise limits will be raised; especially for higher temperature classes, to at least be consistent with those in IEEE C57.21. Hot spot rise limits are deemed satisfactory and reflect the duty that series reactors see in-service.
The meeting adjourned at 9:15 a.m. The Chairman stated that he would prepare Draft #4 prior to the Memphis meeting.

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

The meeting met in the Amphitheater II meeting room of the Hilton, Jackson in Jackson, Mississippi.

Chairman John Sullivan called the meeting to order at 1:45 PM on Monday March 14, 2005.

The meeting was convened with fourteen (14) members and seven (7) guests present. Two (2) guests requested membership.

Introductions were made.

The first order of business was to ask the members if they knew of any patents or pending patents that apply to the contents of the C57.12.01 standard. No one knew of any patents that pertained to C57.12.01.

The minutes of the Las Vegas meeting were approved.

The first order of business was table 16 of draft 5. Table 16 was revised to harmonize with IEC. The table listed a final conductor temperature, after short circuit, of 200 °C for aluminum by temperature class. Proposed table 16 provided temperatures for copper and aluminum. After discussion, the consensus of the working group was that 200 °C was too low for aluminum and further study was needed before revising the table. This issue will be addressed in the next standard revision.

The second order of business was table 5. Table 5 in draft 5 combines C57.12.01 – 1998 table 4 and table 5 into one table. A column listing maximum line to line system voltages was questioned by working group members. Some table values were also questioned. After discussion, the working group voted to eliminate the maximum line to line voltage column from the table. The working group also voted to keep the table structure and the values within the table as presented.

The last order of business was to revise the introduction to include an explanation for combining table 4 and table 5 into one table. This change involved words and phrases in two paragraphs.

There being no old business or new business, the meeting was adjourned at 3:00 pm.

8.1.3 New Business

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

2 Sites for upcoming meetings were announced.

3 The Association Management System (AMS) was discussed and the chair asked that all attendees register their email address so that SC members could be added to the system.

4 The subcommittee was once again reminded that the working group members are
required to participate and not just attend the meetings. A suggestion was again made for working group chairs to consider removing inactive members from the group. Several WG chairmen stated they had removed inactive members from their rosters.

5 The chair announced that two standards were due for reaffirmation in 2005, C57.134 “IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers” and C57.94 “IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry Type General Purpose Distribution and Power Transformers. Mike Haas agreed to lead the reaffirmation process for C57.134, and Carl Bush agreed to lead the reaffirmation process for C57.94.

6 Sheldon Kennedy asked about the status of the four (4) ANSI documents (C57.12.50, C57.12.51, C57.12.52, and C57.12.55) transferred from NEMA. The status of the documents remains in flux as we have no information on how to have the documents approved as IEEE standards. The SC chairman will request support from Bill Chiu on how we should proceed.

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

8.2 Distribution Transformer Subcommittee Report – J.E. Smith

J. Edward Smith - Chairman
(edsmith@h-jenterprises.com)
The Distribution Transformer Subcommittee has a total of 14 Active Working Groups, 9 of those working Groups meet in Jackson.

Subcommittee Meeting Wednesday March 16, 2005 at 3:00pm
33 Members
12 Guests
1 Guest Requesting Membership
45 TOTAL

8.2.1 Chair's Remarks & Announcements:
Review of Administrative Committee meeting highlights
  Future Meetings
  New Members
  Transformer Standards Activity
  A request for patent disclosure concerns was made with none being indicated.
  The Unapproved Las Vegas minutes were approved with no corrections.

Special Working Group Activity
Those Working Groups that met in Jackson along with the minutes of each are as follows. . .

Six of these standards are currently in the balloting process or just completed the balloting process with two others to be balloted in the near future

8.2.2 Working Group Reports
8.2.2.1 C57.12.20 Overhead Distribution Transformers
(Alan Wilks & Tommy Cooper Co Chairs
(awilks@ermco-eci.com & Tommy.cooper@faypwc.com)
PAR Status: Current
PAR Expiration Date: 12/31/ 2005
Current Standard Date: 1999
Current Draft Being Worked On: 10d  Dated 03/05
Meeting Time: 09:30am, Monday, March 14, 2005
Attendance: 34 Total
19 Members
15 Guests
0 Request for membership

**Issues, Remarks & Announcements:**
Alan Wilks called the WG C57.12.20 meeting to order at 9:30am, introductions were made and rosters were circulated. The minutes of the fall 04 meeting in Las Vegas were reviewed and approved. Alan then reminded everyone of the IEEE policy on patents and none were reported.

**Old Business:** The update on the Dielectric Test paragraph for single bushing transformers with the high voltage terminal permanently grounded has been permanently moved to the Sub Committee for Dielectric Tests. The re-circulation ballot status: 95% return with 3 negatives reduced to 2 negatives. Editorial changes made, and one dissenter present objected to the definitions 3.1 and 3.2 saying that these needed to be in the section pertaining to cover retention tests, not in the general definitions. Alan told him that the definitions were in the section and IEEE made him move them. He informed the dissenter that his concerns would be addressed in the next revision. Alan then went over the comments from the SCC14 committee and everyone agreed that some of the comments would have to be answered by the C57.12 Committee.

**New Business:** Alan plans to submit draft 10d to RevCom for their next meeting before our fall meeting. On the PRD issue, the WG agreed for Tommy to survey the four manufacturers to see if they could meet -40° to + 120°C. Ali’s motion to try for -20°C to +120°C was defeated. Jerry Corkran wanted to survey users on the use of a ground strap on the secondary side of 277 volt transformers, Tommy will send out a survey as soon as Jerry gets him the info. The meeting was adjourned at 10:40 am.

8.2.2.3 C57.12.XX Single-Phase Padmounted Distribution Transformers
**Combined C57.12.25 & C57.12.21**
Ali Ghafourian & Ignacio Ares Co Chairs
(aghafourian@ermco-eci.com & Ignacio_ares@fpl.com)
PAR Status: Approved 12/08/1998 (For combining Standards C57.12.25 & C57.12.21)
PAR expiration Date: TBD
Current Standard Date: 1995
Current Draft Being Worked on: #05-2, Dated: March 2005
Meeting Time: 11:00am, Monday, March 14, 2005
Attendance: 32 Total
17 Members
14 Guests
1 Request for membership

**Issues, Remarks & Announcements:**
The WG met and discuss and approved the minutes of the Las Vegas meeting.

Six Handouts were given:
1) Meeting Agenda
2) Minutes of Las Vegas meeting
3) Drafts dated March 2005 to be renamed 05-2
4) Proposal from Tommy Holifield for table 1
5) System Voltage proposal from Tom Holifield for table 2
6) Transformer Voltage proposal from Tom Holifield for table 2

The WG chains also discussed the recent request by IEEE for identification of any patents related to WG work. None were identified by the group.

The WG discussion centered around the various proposals for tables 1 & 2. Working Group Chairs will incorporate the comments into the next draft.

The WG is working toward a WG ballot after the next meeting.

The meeting adjourned at 12:15 P.M.

C57.12.28, C57.12.29, C57.12.31 & C57.12.32 Represent Cabinet integrity Standards and are handled under one basic working group.

8.2.2.4 C57.12.28 Pad-Mounted Equipment Enclosure Integrity
Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)
PAR Status: Approved
PAR expiration Date: May 09, 2007
Current Standard Date: ANSI/NEMA 1999
Current Draft Being Worked on: D 2.0  Dated: December 2004
Meeting Time: March 15, 2005 Time: 8:00 AM
Attendance: 50 Total
24 Members
26 Guests
4 Guest Requesting Memberships

Issues, Remarks & Announcements:
The re-circulation ballot was successfully completed on 1/27/2005 with 68 affirmatives, 0 negatives and 1 abstention (the 1 negative ballot received on the original ballot was withdrawn).

All required documents have been sent to REVCOM to pursue final publication.

8.2.2.5 C57.12.29 Pad-Mounted Equipment Enclosure Integrity for Coastal Environments
Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)
PAR Status: Approved by NES Com May 23, 2002
PAR expiration Date: May 09, 2007
Current Standard Date: ANSI/NEMA 1999
Current Draft Being Worked on: 1.5  Dated: December 2004
Meeting Time: March 15, 2005 Time: 8:00 AM
Attendance: 50 Total
24 Members
26 Guests
4 Guest Requesting Memberships

Issues, Remarks & Announcements:
The re-circulation ballot was successfully completed on 1/27/2005 with 59 affirmatives, 0 negatives and 1 abstention.

All required documents have been sent to REVCOM to pursue final publication.
8.2.2.6 C57.12.31 Pole Mounted Equipment Enclosure Integrity
Bob Olen & Dan Mulkey Co Chairs  
(bolen@cooperpower.com & dhm3@pge.com)  
PAR Status: Approved by NESCOM N/A  
PAR expiration Date: N/A  
Current Standard Date: 2002 Published March 7, 2003  
Current Draft Being Worked on: Dated:  
Meeting Times: **DID NOT MEET**

8.2.2.7 C57.12.32 Submersible Equipment Enclosure Integrity
Bob Olen & Dan Mulkey Co Chairs  
(bolen@cooperpower.com & dhm3@pge.com)  
PAR Status: Approved by NESCOM N/A  
PAR expiration Date: N/A  
Current Standard Date: 2002 Published March 7, 2003  
Current Draft Being Worked on: Dated:  
Meeting Times: **DID NOT MEET**

8.2.2.8 C57.12.33 Guide For Distribution Transformer Loss Evaluation
Don Duckett & Tom Pekarek Co Chairs  
(don.duckett@fpc.com & tjpekarek@firstenergycorp.com)  
PAR Status: PAR extension renewed for two years  
PAR expiration Date: December 2004  
Current Standard Date: October 2001  
Current Draft Being Worked On: #9 Dated April 2003  
Meeting Date: **DID NOT MEET**

**WORK ON THIS STANDARD HAS NOW BEEN REACTIVATED**

8.2.2.9 C57.12.34 Three-Phase Padmounted Distribution Transformers
Ron Stahara & Steve Shull Co Chairs  
(rjstahara@msn.com & sshull@empiredistrict.com)  
PAR Status:  
PAR expiration Date:  
Current Standard Date: March 8, 2005  
Current Draft Being Worked On: N/A See Below  
Meeting Time: March 14, 2005 Time: 1:45 PM  
Attendance: 43 Total  
23 Members  
11 Guests  
9 Guest Requesting Memberships  

**Issues, Remarks & Announcements**

The C57.12.34 standard has been published and a new PAR is in the process for the next revision of this standard. The scope of the next revision has been changed to increase the kVA size from 2500 to 5000 and the low voltage to include 15 kV class equipment.

Ron Stahara called the meeting to order, introductions were made, and an attendance roster was circulated. The minutes were reviewed and Gerry Paiva’s name spelling was corrected. The minutes were then approved as corrected. Ron reviewed the IEEE Patent Policy and asked the group if there were any patents that needed to be disclosed. None were
Ron announced to the group that the C57.12.34 was published on March 8, 2005 with the printed version available on March 29, 2005.

The wording on the new PAR was reviewed and discussed. There were no changes suggested.

A questionnaire concerning the high/low voltage barrier on deadfront units and the impedance levels was circulated among the user group of the Transformer Committee. The result of this questionnaire was discussed. Gerry Paiva voiced opposition to the removing the high/low voltage barrier due to construction considerations. He explained that if this barrier were removed there would not be a demarcation point between the sections thus decreasing the safety to operating personnel as well as removing the fastener provisions which prevents access to the high voltage area. After some discussion, Ron asked everyone to study this further and be prepared to vote on the item at the next meeting. The impedance issue was also discussed with the same conclusion in that everyone would research this subject and be prepared to vote on it at the next meeting.

Ali Ghafourian suggested that as we develop the new standard we consider using the livefront / deadfront terminology that is defined in the new C57.12.80 document. Ron said that we would obtain a copy of this to review the applicable items for this standard.

8.2.2.10 C57.12.35 Bar Coding For Distribution Transformers
Lee Matthews & Giuseppe Termine Co Chairs
(matthews@howard-ind.com & Giuseppe.termine@peco-energy.com)
PAR Status: New for Revision
PAR expiration Date: December 31, 2009
Current Standard Date: 1996 (R2004)
Current Draft Being Worked On: NEW
Meeting Time: March 15, 2005 Time: 3:15 PM
Attendance: 25 Total
12 Members
13 Guests
5 Guest Requesting Memberships

Issues, Remarks & Announcements:
Request for Patient issues was requested. None were stated
PAR for revision was granted March 4, 2005 and expires December 31, 2009
Remainder of the meeting was review and comments of draft 1
Meeting adjourned at 3:55pm

8.2.2.11 C57.12.36 Distribution Substation Transformers
John Rossetti & David Aho - Co Chairs
(jrosetti@mlgw.org & daho@cooperpower.com)
PAR Status: PAR Approved June 2002
PAR expiration Date: December 2006
Current Standard Date: NEW Standard Under Development
Current Draft Being Worked On: #08
Meeting Date: March 15, 2005 Time: 11:00AM
Attendance: 38 Total
17 Members
18 Guests
2 Guest Requesting Membership

Issues, Remarks & Announcements:
Main Meeting Summary:
The unapproved minutes from the F04 Las Vegas meeting were approved with one correction to reflect the correct PAR expiration date of 12/2006. The patent policy was discussed and no issues were identified.

The focus of the meeting was to review the key pieces of feedback received from the IEEE editorial board and the working group members. The editorial feedback focused on adhering to the IEEE 2005 Style Manual. Their suggestions will require some minor restructuring of the document, correcting document references, proper draft labeling, add copyright statements, and reorganization of clauses. Most of these changes have already been completed.

Key pieces of the working group feedback focused on a variety of functional issues. Clarifications were made to terminology and for specific sections that are meant to provide more guidance versus specific standard requirements. Besides the specific agenda topics, working group feedback in a few additional areas of the document were discussed.

For the most part, all issues were addressed in a manner that should allow this revised draft to be balloted.

Specifics covered during the meeting were as follows:
The first comment was in regards to specifically identifying tap voltage levels. John Rossetti referenced, and passed around, some historical information from a Westinghouse reference regarding tap voltage level selection. It was agreed to keep the increments and percentages as currently stated. There was also some debate over the use of taps, compensate versus regulate, and the impact this could have on core over-excitation if the transformer is not properly designed. Input was requested to suggest any change in wording.

One comment regarding routine tests, and whether there should be a reference to either distribution or power levels was addressed. The WG felt the routine test requirements should be clarified in C57.12.00 and dealt with in another working group. It was concluded that these transformers should be tested as a distribution unit although a user may specify something else if desired.

Creating a definition for a Distribution Substation transformer, beyond what’s currently in the scope, stirred up some lively conversation. Reference was made to the definitions in C57.12.80 for Distribution and Power transformers. The definition proposed in the draft was modified and simplified. John Rossetti will work to get a definition added to C57.12.80 for this particular application. This discussion led into an issue of product and application exclusions, specifically GSU’s, since the standard references both step-up and step-down applications. A question was raised if all GSU applications (i.e.: small diesel gen sets) should be part included in the list of excluded transformers identified in the scope. At this point, GSU applications will not be added to the list of exclusions.

A suggestion was made to keep the impedance values (table 4.5) in sync with those stated in C57.12.10. Some members didn’t like the impedance range defined for kVA ratings less than 750 kVA, although this is consistent with what’s listed in the new 3PH Padmount standard, C57.12.34.

Bushing and cable support requirements (clause 5.2.2) were modified to make it clear that the user is responsible for defining their requirements.
The section for **junction boxes** (clause 5.3.1) was modified to change terminology and clarify the various options. Reference to a cabinet will be changed to “Air Terminal Chamber” which is more of an industry standard doesn’t carry any implicit security or environmental ratings.

**Lifting, Moving, and Jacking Facilities** (clause 5.5) were discussed. A suggestion was made to try and keep requirements in sync with C57.12.10. At this point the existing wording will not be modified. A suggestion was made to define the free clearance variables for F, G, and H in figure 5.4, but the WG felt there wasn’t a need to change the figure or define these values. Also the beveled edge shown in the figure is not a requirement for these size transformers due to the typical base construction and user expectations. The hold down provisions defined under tank construction (clause 5.10.4) was reviewed to make sure requirements and guidelines are clear.

**Tank pressure withstand & manhole size requirements** (clause 5.10). After a good debate, the general feeling was not to modify the withstand requirements. There didn’t appear to be any conflict with the inert gas system requirements (clause 5.9.2) although the wording will be modified to clarify requirements and pressure levels. The minimum manhole size was challenged but it was felt that this shouldn’t be increased due to limited available cover space on smaller units.

**Surge arresters, mounting, and grounding requirements** (clause 5.14) were revised to clarify that the user must define their specific requirements.

Lastly the **Loading** (clause 5.16) was reviewed due to a comment made that the wording was too vague, but currently there aren’t any suggestions for a rewrite.

There were a number of other editorial issues addressed throughout the meeting. Thanks to everyone for reviewing the draft, providing constructive feedback, and contributing to active meeting participation. The meeting adjourned at 12:18pm.

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8.2.2.12 C57.15-200X Step-Voltage Regulators
(Craig Colopy & Gael Kennedy Co Chairs
(ccolopy@cooperpower.com & grkennedy@nppd.com)
PAR Status: Active
PAR Expiration Date: April 2004
Current Standard Date: C57.15 – 1999 – Published April 2000
Current Draft Being Worked On: Draft 4   Dated: October 2004
Meeting Date: March 15, 2005 Time: 13:45
Attendance: 23 Total
17 Members
5 Guests
1 Guest Requesting Membership

**Issues, Remarks & Announcements:**
- Introduction of all Present
- Routing of Attendance Sheets
- Minutes of the Last Meeting 10/26/04 **Approved** (moved, 2nd by Ron Staraha )
- Question on any Patent conflict or infringements given to group – No responses
- Letter on extension of PC57.15 to Dec 2006 displayed
- Comments on comparing to items in 12.90

Comments on Draft 4.0 as received
List middle initials to names of committee members for consistence
Change ground symbol on fig 1 & 2, 3.54 and 3.55
Temperature rise dependent upon insulation - Table 2
Definition comment – use of the ‘usually’ on ratings, revised wordage in 3.54 and 3.54
Clarify the kVA and Amps limitations on 7.2(a) and 7.2(b)
Editorial – comments include text size: use of may, must, and shall: 8.9.4 formula 29 check characters needed Mass kg vs. lb:
Table 19 and discussion - awareness on angle differences and possibility of confusion was discussed. Need input from the group.
There was a concern with title of Document and the PAR Scope and Purpose, What it says concerning the purpose and scope on the PAR versus the Document? Don’t match – a revision to the PAR is being requested.
Comment on Dual Logo Standard – IEEE and IEC, referencing the IEC Application Guide for Regulators within a Standard.

The corrected Draft, which will now be 5, will be sent out to all members of the committee for a 45 day comment period. Please return all comments to Craig as soon as possible.

Motion from Lee Mathews to adjourn, 2nd. Tom Basset and passed.

8.2.2.13 C57.12.37 Electronic Reporting of Test Data (formerly P1388)
Richard Hollingsworth & Thomas Callsen Co Chairs
(rhollin@howard-ind.com & Thomas.Callsen@ExelonCorp.com)
PAR Status: Submitted for editorial review and balloting
PAR Expiration Date: December 2005
Current Standard Date: Published under IEEE Std. 1388-2000
Current Draft Being Worked On:
Meeting Date: March 15, 2005 Time: 9:30am
Issues, Remarks & Announcements:
Ballot Results:

78 eligible people in the ballot group

57 affirmative votes
  2 negative votes with comments
  0 negative vote without comments
  2 abstention votes

61 votes received - 78% returned
  3% abstention
The 75% affirmation requirement is being met.
57 affirmation votes
  2 negative votes with comments

59 votes - 96% affirmative

Editorial had 1 comment – agreed and corrected
SCC14 had 3 comments – agreed with 1 and it has been corrected
2 comments had to do with industry definitions. I provided SCC14 with documents showing the approved definition. SCC14 rejected the explanation. I sent to subcommittee chairmen and IEEE liaison.

Dave Ringle reviewed and sent document to RevCom.

Minutes:
- Membership introduction with rosters passed around.
- Review of IEEE Patent Policy – No Patents reported
- Review of the PAR Status. Comments and discussion made concerning the SCC14 negatives on definitions.
- Comparison of C57.12.37 Data Set and the requirements of C57.15-1999 (Step Voltage Regulators) paragraph 8.9.5 (Certified Test Data).
- After discussion on the reorganization of the document, to determine how to handle the various different data fields, a vote favored the use of “Normative” Annexes.
- Discussion was held on including Dry Type - Distribution Transformers and Power Transformers. The suggestion was made and agreed upon to not include Power Transformers at this time. A subsequent suggestion was made to include the Dry Type, but not under the next PAR.
- In Summation: After the existing PAR is complete, a new PAR will be requested that will include Step Voltage Regulators.
- We request a time slot for the Fall 2005 meeting in Memphis Tennessee.
- Having no further business, the meeting was adjourned.

8.2.2.13 C57.144 Guide to Metric Conversion of Transformer Standards
Tim Olson Chair
(tolson@hydro.mb.ca)
PAR Status: Active
PAR Expiration Date: April 2006
Current Standard Date: New Document
Current Draft Being Worked On: D5  Dated: March 10, 2004
Meeting Date:     Time:
Meeting Times: DID NOT MEET

8.2.3 Subcommittee Old Business:
None reported

8.2.4 Subcommittee New Business:
None reported

8.3  Dielectric Test Subcommittee – Loren B. Wagenaar, Chairman; Stephen Antosz, Secretary

The Dielectric Test Subcommittee (DTSC) met on Wednesday, March 16, 2005, in Jackson, MS with 61 members and 34 guests present. None of the guests requested membership in the Subcommittee. See the last page of these minutes for attendance list.

8.3.1 Chairman’s Remarks

The Chair reviewed highlights of the Administrative Subcommittee meeting held on Sunday:
1) Everyone was encouraged to sign up and keep their profile information updated on the Association Management System, AMS. It will be the main method of communication. Working Group chairs and secretaries are authorized as administrators to AMS, and should be able to pull rosters, etc. from it.

2) Next meeting date and location is October 23-27, 2005 in Memphis, TN. Technical tours are planned for ABB Alamo, Reinhauen and Ermco.

3) The minutes of the Fall 2004 meeting in Las Vegas, NV were approved as written, and are available on the IEEE Transformers Committee Web Site.

4) It was pointed out that specific patent issues that have been raised at previous meetings do not have to be raised at future meetings. However, the chairs of working groups and task forces must continue to ask at the start of each meeting if there are additional patents that may be related to the work of the WG or TF, and results must be recorded in the minutes.

8.3.2 Working Group Reports

8.3.2.1 Working Group on Acoustic Partial Discharge Tests in Transformers - J.W. Harley, Chair

Attendance: 9 members and 5 guests attended the meeting. Attendees introduced themselves. The minutes from the October 25, 2004 Las Vegas NV meeting were approved. IEEE Patent disclosure requirements were discussed and a request was made for attendees to identify or disclose any patents that may be related to the work of the WG.

- Hem Shertukde stated the equipment of his company was covered by patent #6,178,386 and the software was protected by copyrights. We think the PC57.127 Draft Guide descriptions of workstation and on-line systems are general enough that there are no conflicts with the patent.
- A request for a Patent Letter of Assurance will be sent to the holder of patent #6,340,890, which covers the Three Sensor System and locator algorithm in Section 5.7 of the Guide.

The main Working Group activity is to expand and up-date IEEE PC57.127 Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors. The meeting activities included the following.

1. The Chair thanked members of the HVDC Working Group for their contributions to Section 9.6 HVDC transformers and reactors.
2. A new section will be added to the body of the Guide suggesting the situations in which acoustic PD tests are used.
3. Alan Darwin led a group discussion relating to (a) wording of Section 9.6 HVDC transformers and reactors, (b) changes to Annex A, the bibliography, and (c) questions from the last WG meeting about whether the Guide should recommend when to use conventional PD acoustic tests and when to use continuous on-line tests. With reference to the last item, the group decided to not make these recommendations in the Guide.
4. Dirk Russwurm's group reviewed Annex D, which has been added as a tutorial for the detection and location of acoustic emissions from partial discharges, and a number of other changes made as a result of the last WG meeting.
5. The WG approved the Guide being sent to the Dielectric Tests Subcommittee as a survey before balloting. This will be coordinated with Loren Wagenaar and Steve Antosz.
8.3.2.2 Working Group on Revision of Low Frequency Tests - Mark Perkins, Chair

The working group met Monday, March 14, 2005 at 11 am. There were 16 members and 29 guests present. 6 guests requested membership.

After the introduction of members and guests, the chairman announced that he would no longer continue in the position, and that Bertrand Poulin would be the new chair. The IEEE patent policy was discussed as requested by the committee leadership. No one in attendance indicated any patents that were applicable. The minutes of the Las Vegas meeting were discussed, and Loren Wagenaar asked that we amend them to indicate that no one in the Las Vegas meeting indicated a patent was applicable. The minutes as amended were approved.

The report on the meeting of the task force on revision to C57.113 partial discharge guide was given by Dr. Eberhard Lemke. For specification of PD detectors measuring the apparent charge consideration must be given to PD test equipment in use today. For this purpose a Survey has been distributed before the meeting to all TF members. The PD Survey was approved by the TF members and will be sent to all Dielectric Subcommittee Members prior to next meeting.

The comments submitted to the first draft have been incorporated in the second draft, which was distributed to all TF members. Draft 02 of C57.113 revision was reviewed and a number of changes were recommended. Harmonization with IEC 60270 is the ultimate goal, but consideration must be given to existing PD measuring systems for transformer testing, which may not meet completely the IEC requirements. The survey will help determine this. Results from the task force meeting along with the oral and written comments of the TF members will be incorporated in a third draft, which will be submitted to all TF members before the next meeting. The meeting adjourned at 9:30.

The next item of business in the working group was the special test procedures being used on single-phase distribution transformers with a permanently grounded high-voltage winding terminal be incorporated into C57.12.00. The following wording was approved: For single-phase transformers with a BIL of 150 kV or less that have only one high-voltage bushing, the high-voltage neutral terminal permanently connected to ground, and no secondary windings permanently grounded, no applied-voltage test is required. These transformers shall receive an induced-voltage test between the HV terminal and ground with duration of 7200 cycles but not less than 15 seconds. This voltage shall be 1000 volts plus 3.46 times the rated transformer winding voltage, but in no case shall the line-to-ground voltage developed exceed 40 000 volts for 125 kV BIL or 50 000 volts for 150 kV BIL. An applied potential test shall be applied to all windings that are not permanently grounded. Coordination needs to be done with the group on 3 phase distribution transformers.

The group then discussed comments from the last 2 ballots of C57.12.00. The responses will be forwarded to Subhash Tuli so that the reviewers can be notified.

The working group then discussed a proposal by Subhash Tuli for low frequency dielectric testing of buried tertiary windings. The consensus of members was not reached, so the discussion was tabled.
8.3.2.3 Working Group on Revision of Impulse Tests – Pierre Riffon, Chair; Peter Heinzig, Vice-Chair

The WG met on March 15, 2005, from 3:15 pm to 4:30 pm. Twelve members and twenty-three guests attended the meeting. Four guests requested membership. The agenda was accepted as written. The minutes of the Las Vegas meeting were approved as written. The IEEE patent disclosure requirement policy was discussed. Reference to the package posted on the IEEE Transformers Committee Web site was made. None of the members and guests present during the meeting were aware of any patents related to the work of the WG.

1. The first technical subject on the agenda was to discuss the switching impulse test waveshape polarity. The actual clause 10.2.2.1 of IEEE C57.12.90 specifies that either negative or positive polarity switching impulses may be used for switching impulse tests. IEC 60076-3 specifies that negative impulses have to be normally used for switching impulse tests in order to avoid risks of erratic external flashover. IEC 60076-3 does also call for an additional switching impulse type test with positive polarity waves for demonstrating the dielectric withstand of air clearances for cases where the air clearances are shorter than prescribed.

For oil-paper insulation structures as used in power transformers, the waveshape polarity has more or less no influence on the dielectric withstand. Nevertheless, for air gaps, the positive polarity is the most onerous polarity and the dielectric withstand is significantly less than for negative polarity impulses. After discussion it has been agreed upon:

- Only negative polarity impulses shall be used for demonstrating the transformer voltage withstand during switching impulse tests. The wording of clause 10.2.2.1 of C57.12.90 will be modified as follows: "Negative polarity waves shall be used".
- It has been also decided that the wording of the Impulse Test Guide (C57.98) to be modified accordingly together with an explanation that this is for avoiding erratic external flashover. This request has been forwarded to the WG chair responsible of the revision of C57.98.
- It has been also decided that the voltage withstand of air clearances (phase-to-ground and phase-to-phase) does not need to be demonstrated by an additional switching impulse test using positive polarity waves because phase-to-ground and/or phase-to-phase clearances have not been a problem in service so far.

2. The second technical subject on the agenda was the review of the survey made on impulse test procedure for transformers having non-linear devices. The survey has been sent to the Dielectric Tests SC chair on October 27, 2004. Because of the difficulties experienced by transmitting attachments to Emails, the survey was never made. In order to overcome these difficulties, the proposal has been already posted on the IEEE Transformers Web site and the request for survey within the Dielectric Tests SC membership will be posted by using the AM system before the end of March 2005. Moreover, a reminder notice will also be sent to the Dielectric Tests SC membership a week prior to the deadline date also by using the AM system. With such a procedure, the WG feels that the problems experienced will be solved and that the survey procedure will be improved.

3. The third technical subject on the agenda was the review of the survey made within the WG membership on October 2004 concerning the revised proposal on lightning impulse test procedure for cases where the tail time of the impulse waveshape can not be obtained. Out of 51 survey requests sent, only 6 responses have been received. Here also, approximately
half of the WG membership did not receive the attachment to the Email. Nevertheless, the number of responses received was quite disappointing and the WG chair pointed out that it is the responsibility of the WG members to respond to surveys. Out of the 6 responses received, 4 were affirmative and 2 negative. The responses received together with the two negative ballots were reviewed and it has been agreed upon that:

- The title of the table stating the minimum recommended impulse generator capacitance and energy will remain as stated in the document surveyed.
- The time frame where the notice to be given by the manufacturer in case where the tail time can not achieved has been lengthily discussed. Several counterproposals have been proposed and none of the proposal got significant acceptance. Among the counterproposals made, the notice may be given at the time of bidding, prior to contract or prior to final electrical design or design review if applicable. Because a clear lack of majority during the WG meeting and the lack of responses received on the survey, it is more likely that the same proposal as surveyed will be proposed once more.
- In order to overcome the difficulties experienced by sending attachments to Emails, the proposal will be also posted on the IEEE Transformers Web site and the request for survey within the WG membership will be sent by using the AM system before the end of March 2005. Moreover, as also decided for the impulse test procedure on transformer having non-linear devices, a reminder notice will be sent to the WG membership a week prior to the deadline date.

Because the WG meeting was running out of time, the remaining parts of the agenda were not discussed and will be added on the agenda for the Memphis meeting.

8.3.2.4 Working Group for Revision of the Impulse Test Guides C57.98 and C57.138

Art Molden, Chair; Joe Melanson, Secretary

The WG met at 3:15PM on Monday March 14, with 39 attendees present of which 8 were members and 31 were guests. Chair Art Molden was unable to attend due to previous commitments, so Secretary Joe Melanson chaired in his place. Art sends his apologies.

The IEEE Patent Policy slides were reviewed with the group. The group was polled to see if there were any known patent issues to disclose relative to this standard. None were indicated by any of the attendees.

The Minutes of the last meeting in Las Vegas were approved.

Under Old Business, the group was shown the extensive revisions to the Guide put on the grouper for their review and comment by Art Molden. The group was encouraged to review the document and send any comments to Art Molden or Joe Melanson. NOTE: Subhash Tuli indicated after the meeting that he will forward some digital oscillograms for inclusion in the revised Guide.

Moving on to New Business, the group was asked to assist with the submittal of existing digital records of impulse tests that could be used to update the standard with current digitizer outputs. The manufacturers were asked to submit any records that they could in ASCII format so that they could be imported into EXCEL. They were informed that the records would be kept anonymous.
Joe Melanson discussed the use of Transfer Function by some of the test labs that have the software on their digitizers. The idea is to include information in the standard describing the operation and implementation of the software as a tool in the testing of transformers.

Thang Hochanh was introduced and presented a project on Transfer Function that he is coordinating with other test labs. The study will incorporate Transfer Function results submitted for evaluation from all of the participants. The information results will be presented to the Working Group at a later meeting for consideration and possible inclusion in the standard.

Bertrand Poulin commented on the development of the Transfer Function that he was personally involved with for more than 20 years. He provided slides and records of examples of Transfer Function analysis that he has made that show a need for further study and development of an “index” to support the reliability of existing software. He indicated that it is often difficult to judge the quality of the output waves. The transfer function is used by some test laboratories to determine whether the differences in the voltage and current waveshapes are due to problems inside or outside of the transformer. It would be helpful to have some type of indicator, and he has developed a rough tool that indicates whether or not there is sufficient magnitude of signal available at given frequencies. The tool is based on the resolution of the amplifier used. The criterion that Bertrand uses is for signals that are less than 1% of amplitude and yield an index of less than one. Several comparisons were shown including: 1) reduced and full waves showing a successful comparison, 2) reduced and full waves showing a failed comparison and therefore a problem within the transformer, and 3) full and chopped waves showing a successful comparison. In general, whenever the index is unity within the corresponding frequency region, and the transfer functions of two waveshapes agree, then the test is successful. Conversely, whenever the index is less than unity and the transfer functions do not agree within their frequency region, then the statistical test is not successful. Bertrand suggests that suppliers of digital impulse recorders may need to be contacted to develop systems to determine such an index.

Subhash Tuli proposed that a tutorial be presented to the group detailing the application and uses of the Transfer Function be made at the next meeting. Mr. Poulin was asked to participate and present the tutorial. He agreed, and asked that others with experience in the group also participate in the tutorial. NOTE: Ernst Hanique volunteered after the meeting to participate in the development of the tutorial. Others will be contacted for possible participation.

There were no more questions or comments and the meeting was adjourned.

8.3.2.5 Task Force on Liquid-Filled Transformers Dielectric Test Tables – Phil Hopkinson, Chair; Scott Choinski, Secretary

The working group met on March 15, 2005 at 1:45 PM with 43 participants present. The following comments received on Revision 9 of these tables were discussed and resolved:

− In response to the survey, it was decided not to indicate any preferred BIL ratings in these tables.

− It was agreed that Table 1 should be split into separate tables for Distribution and Class I and Class II transformers.

− Comments from Mr. Bipin Patel were discussed. It was decided that:
The test tables should show Class I transformers to include units of ≤ 69 kV rating.

The applied test levels for internally grounded neutrals were discussed. It was agreed that internally grounded neutrals should not be given applied tests as stated in Note 7 of Table 7.

The use of 150 kV BIL ratings for neutral terminals for windings ≥ 362 kV rating was discussed. It was agreed that the min BIL rating of 110 kV as shown in Table 1b will be acceptable.

Mr. Pierre Riffon expressed satisfaction with the separated tables for Class I and Class II transformers. In response to his comments it was agreed that these Test tables express insulation levels for only effectively grounded neutral systems. Mr. Riffon will draft a note that addresses this issue.

Mr. Gustav Preininger had pointed out that the ratio of System to Nominal voltage was not consistent. He also stated that 825 kV BIL is too high for 161 kV system. He also questioned the need for Steep Front Tests.

The WG decided that all these test values reflect historical practices and should not be changed. Steep Front tests as shown in Table 2 will also be kept in this table for reference by the use in special cases.

Mr. Loren Wagenaar pointed out that in the present tables the applied tests cannot be directly related to BIL ratings. He also pointed out that the ratio of 2.5, as stated in Note 11 of Table 1b, between applied test and minimum neutral BIL is not consistently reflected in the present neutral BIL levels. The WG voted to remove Note 11 from the Table.

It was agreed that the test tables will be revised and sent out for WG comments. There was no new business. The meeting adjourned at 3:00 PM.

8.3.3 Liaison Reports

8.3.3.1 Surge Protection Devices – Bob Degeneff

The Working Group on Switching Transients Induced by Transformer/Breaker Interaction met at 8:00 AM on March 15, 2005. There were 69 attendees, with 32 members and 37 quests.

1. The Switching Transients Interaction Guide was sent to IEEE editors for review, and comments were received back on March 11, 2005.
2. The ballot pool will be established utilizing myBallot™ and the document will be in the hands of the balloters by mid to late April.
3. Bob Degeneff and Sam Mehta will make a presentation of this groups work to the CIGRE SC A2 Committee at the Colloquium to be held in Moscow in June.
4. The group was asked if it should continue its efforts, by investigating back-feed energization of transformers since there are many similarities to the work in C57-142. It was determined that the group should complete its current effort to ballot and publish this guide, and only then, to consider this activity.
5. Under new business Mel Smith of the Switchgear Committee asked the working group if any progress had been made in determining the typical resonant frequencies of transformers. The Switchgear Committee would like to utilize this information to determine transient recovery voltages (TRV), and would like to work with values representative of transformers currently in service. This will be a topic addressed at the
next meeting. Ramsis Girgis suggested two presentations be made at a future meeting to facilitate understanding of the data required; the first by the Switchgear Committee detailing the data needed for the recovery voltage they are computing and the second, a tutorial of resonances within transformers by a member of the transformers committee.

8.3.3.2 High Voltage Test Techniques (HVTT), IEEE Standard 4 - Arthur Molden

Last meeting was Dec 20-21 in Brewster, NY. Art did not attend. There is no report.

8.3.4 Old Business

8.3.4.1 Results of Survey

A survey was conducted in January within the DTSC covering two ongoing issues:

- whether to apply impulse tests to all power transformers
- whether to extend the coverage of Class II transformers down to 69kV

On the first issue, there were 18 affirmative, 16 negative and 3 abstentions. On the second, there were 22 affirmative; 12 negatives; and 3 abstentions. Obviously the response was very low on both issues. The chair interpreted these results to be that neither resolution passed. Therefore both issues will be dropped.

8.3.4.2 Steep Front Test Levels

Subhash Tuli brought up the question of how to handle steep front testing when it is specified. at the Fall 2004 meeting. The test levels were removed from C57.12.00 in 1993. Should this be removed from the table as an “other” test, or not? Should the rise time and other waveshape characteristics be specified? In what form and where should this be done (in the main body or an Annex)?

This topic seems to come up again and again every few years. The collective memory was that this was voted on before and the levels have been removed and are left out on purpose. If they are in C57.12.00, it may imply promotion of this test, and that is not what the industry wants to do. However, people are still specifying the test anyway, so what guidelines are available in these rare cases. People seem to go back to the old standards as a guide. If this is the case, then maybe they should be added back somewhere.

It was suggested that a Task Force will be formed to address this issue (“once and for all”), but no definitive decision was made on this issue. NOTE: The chair will circulate an e-mail asking for volunteers to serve on a task force to advise the proper location, if any, for specifying these tests.

8.3.5 New Business

8.3.5.1 Subhash Tuli reported that both main documents C57.12.00 and C57.12.90 will go out for ballot soon. The only changes from Draft 2 will be the editorial comments received in the previous ballot. The substantive changes are being or will be addressed by the appropriate subcommittee.

8.3.5.2 The chair will coordinate a tabulation of all the comments from the initial ballot of C57.12.00 and C57.12.90 and distribute to the appropriate WG’s within the Dielectric Test SC for action.
### Members Present

1. Aho, David  
2. Ahuja, Raj  
3. Antosz, Stephen  
4. Arpino, Carlo  
5. Artiega, Javier  
6. Barnard, David  
7. Britton, Jeffrey  
8. Bush, Carl  
9. Colopy, Craig  
10. Corkran, Jerry  
11. Crouse, John  
12. Darwin, Alan  
13. Daubert, Ron  
14. Davis, Eric  
15. Degeneff, Bob  
16. Dudley, Richard  
17. Elliott, Fred  
18. Fallon, Donald  
19. Forsythe, Bruce  
20. Ganser, Robert  
21. Garcia, Eduardo  
22. Garnitschnig, Andreas  
23. Gianakouros, Harry  
24. Gomez-Hennig, Eduardo  
25. Goodwin, David  
26. Griesacker, Bill  
27. Gruber, Myron  
28. Hanique, Ernst  
29. Hayes, Roger  
30. Heinzig, Peter  
31. Henning, Bill  
32. Hochanh, Thang  
33. Hopkinson, Philip  
34. Kennedy, Sheldon  
35. Lemke, Eberhard  
36. Leuenberger, Boyd  
37. Machado, Tamyres  
38. Matthews, John  
39. Melanson, Joe  
40. Miller, Kent  
41. Moore, Harold  
42. Northrup, Steve  
43. Perkins, Mark  
44. Platts, Don  
45. Poulin, Bertrand  
46. Raymond, Tim  
47. Riboud Jean-Christophe  
48. Riffon, Pierre  
49. Rossetti, John  
50. Sampat, Mahesh  
51. Sharma, Devki  
52. Shteyih, Ibrahim  
53. Sim, H. Jin  
54. Snyder, Steve  
55. Speegle, Andy  
56. Steineman, Andrew  
57. Stiegemeier, Craig  
58. Tuli, Subhash  
59. Wagenaar, Loren  
60. Walls, Albert  
61. Ziomek, Waldemar

### Guests Present

1. Sergiy Razuvayer  
2. Dhiru Patel  
3. Marcel Fortin  
4. Jesse Patton  
5. CP McShane  
6. Dwight Parkinson  
7. Marion Jaroszewski  
8. Steven D. Brown  
9. Sylvain Lapointe  
10. Barry Beaster  
11. Scott Digby  
12. Clair Claiborne  
13. Jeff Serzan  
14. Miguel Oliva  
15. Jose E. Grijuela  
16. Craig Derouen  
17. Gael R. Kennedy  
18. David Dunlap  
19. James Kilgore  
20. Steve Jordan  
21. Martin Navarro  
22. Alan Wilks  
23. Juan Castellanos  
24. George Tolbert  
25. Arturo Del Rio  
26. Virendra Jhonsa  
27. Christoph Schuette  
28. David W. Scaquetti  
29. Sten Andersson  
30. Dan Dorris  
31. Christoph Ploetner  
32. Josh Herz  
33. Oleg Roizman  
34. Hossein Rezai  

* Requested Membership. (None)
8.4 HVDC Converter Transformers & Reactors – R. F. Dudley


The S.C. met in the Amphitheater 1 Meeting Room of the Hilton Jackson Hotel in Jackson, Mississippi on Mar. 14, 2005 from 1:45 p.m. to 3:00 p.m. There were 11 members and 6 guests present. The following are the highlights of the meeting.

1. The minutes of the S.C. meeting in Las Vegas were approved. The minutes of the Jackson meeting will not be approved until the S.C. meets in Memphis, Tennessee.

2. IEEE patent policy was reviewed; details are available at the Transformers Committee website. No patents affecting the revision process of IEEE C57.129 were noted.

3. The Chairman reported on the meeting of the Administrative S.C.

4. The Chairman informed S.C. attendees that the current version of IEEE 1277 (smoothing reactors for HVDC application) will reach its end of life Dec. 31, 2005; reaffirm or revise (PAR). It was decided that the action should be to revise IEEE 1277. The Chairman will apply for a PAR. Input from the revision process of IEEE C57.129 and the revision of IEC 60076-6 (reactors; including smoothing reactors) will be taken into consideration.

5. Plans are in process for the S.C. to sponsor a tutorial session in sound at the Memphis meeting. The focus will be sound generation mechanism and measurement for transformers and reactors; including converter transformers smoothing reactors (oil-immersed and dry-type) and filter reactors.

6. Draft #3 of the revision of IEEE C57.129, prepared by RFD was discussed. The highlights are as follows.

   (i) Lars-Erik Juhlin’s input/revision of ANNEX E was deemed to be very good. This annex is now essentially complete.

   (ii) Acceptable levels of gassing during the overload test were discussed. It was agreed that gas monitoring should be part of the overload test. Gas evolution data from overload testing of converter transformers plus data from testing of standard power transformers will be evaluated to arrive at acceptable/consensus levels of gassing for the overload testing of converter transformers. The inclusion of “non detectable” levels should not be a criteria but less than a minimum level is acceptable criteria. Peter Heinzig and Christoph Ploeotner will prepare a new draft table of acceptable levels of gassing, based on previous drafts plus any data available from sources in their company, and they will circulate to Pierre Riffon, Les Reckseidler, Waldemar Ziomek, Lars-Erik Juhlin and Sten Andersson for input/modification. The objective is to arrive at consensus and RFD will include the results in Draft #4.
(iii) The recently completed IEC application guide for HVDC converter transformers will be included in the References.

7. Les Reckseidler made a presentation on the analysis of converter transformer failures occurring on Manitoba Hydro’s two bipoles. Some key observations included; tap lead problem masked other problems, failures were not always preceded by gas evolution, overload testing in the factory may be beneficial, design review can identify potential problems. This analysis of these converter transformer failures by Manitoba Hydro provided the basis for some of Les’ input into the revision process for IEEE C57.129. Copies of Les’ presentation will be e-mailed with the minutes to S.C. members ONLY and are to be used ONLY in conjunction with the revision process of IEEE C57.129.

The Chairman promised to produce Draft #4 prior to the Memphis meeting. The meeting adjourned at 3:00 p.m.

R. Dudley

8.5 C57.13 Instrument Transformers – J. Smith - Unapproved Minutes

The Subcommittee met on March 16.

6 members and 9 guests attended

8.5.1.1 Chair’s Remarks & Announcements:

The Chair asked the attendees if they were aware of any patent issues as required by the new IEEE policy. There were none.

The previous meeting minutes were approved as written

The minutes of this meeting are to be submitted by June 20

8.5.1 Working Group Reports:

8.5.1.1 WG C57.13.5 - Working Group on Test Requirements for High Voltage Instrument Transformers 115 kV Nominal System Voltage and above

The WG met on March 15, 2005. Eight members and seven guests attended the meeting. Two guests requested membership. The meeting was co-chaired by Mr. P. Riflon and Mr. R. McTaggart.

The agenda was approved as written.

Minutes of the Las Vegas meeting were approved as written.

The IEEE patent disclosure requirement policy was discussed. Reference to the package posted on the IEEE Transformers Committee home page was made. None of the members and guests present during the meeting were aware of any patents related to the work of the WG.
The Trial-Use Standard C57.13.5 has been published by IEEE in August 2003. No feedbacks have been received yet on the use of C57.13.5. It appears that this document is again still too young to get feedbacks. None of the manufacturer representatives present during the meeting have used this document yet on actual orders.

A survey on Annex H (current transformers used as unbalance current protection of capacitor banks) and on clause 4.5 (Temperature rise of terminals) have been circulated on November 15, 2004 within the WG membership and within the Instrument Transformers Subcommittee membership. The response was very poor, only 3 responses have been received. The WG co-chair did ask the membership to respond to such survey because it is the only way the get things going forward. It is the responsibility of the WG and SC membership to respond to such surveys.

The comments received were mainly editorial and were reviewed. Revised versions of Annex H and clause 4.5 taking into account the comments received have been presented. In addition to the editorial corrections, the following has been agreed upon:

- A note will be added in Annex H saying that an inductance measurement of the primary winding in the saturated mode may be performed in order to calculate the resulting voltage across the primary winding for adjusting the protective level of the voltage protective device.

- Annex H will be send to the IEEE WG chair responsible of shunt capacitor bank standards for comments.

- An explanatory note will be added to clause 4.5 to better define the term "terminals".

The two revised documents will be surveyed within the WG and SC membership. The deadline for response will be set to one month and a reminder Email will be send to the WG and SC memberships one week prior to the deadline. With such reminder, it is anticipated that the response will be more significant.

A first draft of Annex I related to gapped core CTs having transient performance requirements has been presented and discussed. A possible reference to IEC 60044-1,2003 has been discussed. The WG co-chair will look if it is applicable and if such, reference to both IEC 60044-1 and IEC 60044-6 will be made. This Annex will also be surveyed within the WG and SC membership.

A PAR needs to be issue and approved prior to the next meeting. The PAR will be send to IEEE in the next few weeks.

On the New Business, Joe Ma requested to add a note in clause 8.4 of C57.13.5 explaining why some tests need to be performed on tapped portions of the CT winding. After discussion, such a note will be added and a first draft will be circulated prior to the next meeting for comments and discussion.
Chair’s remarks & Announcements:
The subcommittee met on March 15, 2005 with four members and five guests present. The Chair asked the attendees if they were aware of any patent issues as required by the new IEEE policy. There were none.

Old business
Results of C57.13.6 D3 Recirculation:
Pool closed February 12, 2005
Ballot met 75%/a retuned requirement (91% returned)
82 Eligible people in-group
69 affirmative
2 negative*
4 abstention votes
The 75% affirmation requirement was met (97% affirmative)
* Note: 2 negative were carried forward because balloters did not reverse vote from D2. Therefore, 71 votes were affirmative, or 100% acceptance.

New Business:
Review and discuss ballots with comments:

1) James Frysinger, Vice Chair SCC14
   Style and usage suggestions repeated from (not addressed) from regarding SI use of quantities vs units. Specifically, Table 2 heading "Volt Amperes" (an SI unit) should be change to Total Power (a quantity).
   Chair adopted suggested best practice., Will recommend WG not recirculate this style improvement.
   Meaning of footnote in Table 2 unclear.
   Chair corrected awkward wording and will review with WG. Will recommend WG not recirculate this style improvement.

2) Ted W. Olsen, Siemens Power
   Meaning of footnote in Table 2 unclear
   Accepted, same correction as above.

Other
A proposal for WG consideration came from Dave Lildinson of the Ontario Independent Electricity Operator (IESO), which is also pursuing these ideas with the Canadian Standards Administration. The chair offered to review with WG and share comments regarding future coordination.

8.5.1.3 Working Group on C57.13 Revision – Tom Nelson
The Working Group met on March 15, 2005. The chairman, Tom Nelson, was absent and Chris TenHaagen chaired the meeting in his absence. There were 6 members and 7 guests at the meeting. The patent disclosure was reviewed.

The Working Group discussed the test methods proposed in the revised version of C57.13 that is being prepared for balloting.
The Working Group reviewed the IEC Standard 60270-2000 on the test equipment calibration and requested that the C57.13 Subcommittee Chair obtain a copy of the latest reversion for the Working Group to review and determine if it is appropriate for US application.

8.5.1.4 Joint PSIM/Transformer Working Group - PAR P1601 Optical Current and Voltage Sensing Systems

Session co-chaired by: Harley Gilleland and Farnoosh Rahmatian (TC/ITSC)
Attendees: M.J. Lee (G), P. Zhao (M), M. Haas (G), M. Rajadhyaksha (G), L-E Juhlin (G), C. Burns (G), R. Gomez (G), J-N Berube (G), K. Yule (G), L. Davis (M), R. McTaggart (M), Paul Millward (M), J. Smith (M), F. Costa (G)

- IEEE disclosure requirements regarding patent issues related to the WG work were presented
  - Mr. Rahmatian asked if anyone is aware of patents relating to the content of PAR 1601 work. There were no responses. It was noted that no patent or IP was disclosed or identified as relevant to P1601 work.

- Minutes of previous P1601 meeting at Transformers Committee meeting, October 25, 2004, Las Vegas were reviewed and approved.

- PAR status and timetable were reviewed
  - Scheduled completion date: December 2005
  - Extending the completion date the PAR P1601: need to make decision in June 2005 if needed.
  - Scheduled P1601 Meetings:
    - October 2005, TC, Memphis, TN
  - Target the June 2005 meeting as the meeting to start final balloting
  - make decision on extension of the completion date

- Brief update on other standards activities were given by F. Rahmatian and H. Gilleland:
  - UCA Guide for using IEC 61850-9-2 (digital interface to instrument transformers)
  - CSA series (Canadian Standards)
  - CIGRE WG A3.15

- Text of a preliminary draft was reviewed.
  - Preliminary draft to be posted on the Transformer Committee website by March 25, 2005, for broader feedback
  - Preliminary comments on that draft are due before May 10, 2005
  - A revised draft will be available for general comments by June 1, 2005
  - Revised draft to be discussed, in details, at the next meeting in June 2005

- Next Scheduled Working Group Meetings

8.5.2 Old Business
8.5.2.1 Partial Discharge Requirements
The discussion in WG C57.13 on the subject of adding PD testing was reviewed and continued. It was suggested that we adopt IEC 60270 instead, but no one knew whether it is being supported by IEC. There was a question about whether PD was included in the IEC 61869-1 - Common Clauses (it is and it includes reference to 60270). It was also suggested to refer to IEEE C57.113 which includes an appendix on partial discharge recognition.

8.5.2.2 Thermal Testing Results
Ross McTaggart presented the results of partial discharge testing at low temperature.

The objective was to determine the effect of the inevitable frost on the PD performance of a test object immediately after removal from a freezer. This was a concern raised by Marcel Fortin in a previous meeting. The test was done on a 72 kV Capacitor section at -45 deg C. The result was that the PD extinction voltage was 100 kV (2.4 pu) immediately after removal and remained the same 5 minutes later (when more frost had formed). This indicates that this test method is valid, at least for porcelain-clad instrument transformers. Pierre Riffon suggested that the effect on cast resin IT’s might be greater. Mike Haas (ITI) agreed to do some testing to find out. It was also noted that the humidity at the time of test is probably of significance.

8.5.3 New Business

- The concept of “Dual Logo” standards for IEC and IEEE was discussed
- The results of a Hydro 1 survey conducted by Peter Zhao were discussed. The survey indicates that there is little interest in Transient Performance (TPY) CT’s.
- Questions from the C12.11 WG were addressed

8.6 Insulating Fluids Subcommittee – F. J. Gryszkiewicz, Chair; R.K. Ladroga, Vice-Chair

8.6.1 Introduction/Attendance

The Insulating Fluids Subcommittee met in Jackson, Mississippi on Wednesday, March 16, 2005 with 17 members and 19 guests present. Four guests requested membership on the Subcommittee.

8.6.2 Approval of Meeting Minutes

The Minutes of the Las Vegas meeting were approved as written.

8.6.3 Subcommittee Membership

There were no changes to report in the Subcommittee Roster.

8.6.4 Current Subcommittee Business
8.6.4.1 C57.104 – IEEE Guide for the Interpretation of Gases Generated in Oil – Immerged Transformers

This Working Group is Chaired by Frank Heinrichs. A Standards Association Ballot was recently conducted on Draft 11D. Sixteen negative ballots were received. The Working Group, previously, had agreed to participate with IEEE Headquarters in an experimental procedure where negative ballots will be resolved or rebutted via a website based and teleconferencing procedure.

A ballot resolution team is attempting to resolve the negative ballots. This will be followed by a Recirculation Ballot. The Subcommittee plans to submit this document to REVCOM this summer.

8.6.4.2 C57.106 – IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment

Jim Thompson and T.V. Oommen are the Co-Chairs of this Working Group. The Working Group met on Tuesday, March 15, with 4 members and 34 guests in attendance.

As required in the IEEE Standards Board By-law, Section 6.3.2, the IEEE patent disclosure requirements were discussed and a request was made for disclosure of any patents that may be related to the work of the Working Group. There were no responses to the request for disclosure.

The WG Chair, Jim Thompson, opened the meeting and briefly reviewed the revision of Section 4.5 and Table 7. The rewrite of Section 4.5 had been approved at the previous meeting in Las Vegas. The revision to Table 7 was discussed with regard to consensus moisture values, including a footnote, which was added as a caution in using these values.

The guide will be sent out for a Standards Association Ballot before the next meeting in Memphis.

8.6.4.3 C57.130 – Trial Use Guide for the Use of Dissolved Gas Analysis During Factory Temperature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors

This Working Group is Co-Chaired by Frank Heinrichs and Frank Gryszkiewicz. A Standards Association Recirculation Ballot was recently conducted on Draft 15 of this document. A total of six negative ballots were received. Two were new negative ballots and four were unresolved negatives from the Draft 14 Ballot. An attempt will be made to resolve the negative ballots and another Recirculation Ballot will be conducted.

The Subcommittee plans to submit this document to REVCOM this summer.

8.6.4.4 C57.139 – IEEE Guide for Dissolved Gas Analysis of Load Tap Changers

The Working Group, which is chaired by Fredi Jakob, met on Tuesday, March 15, with 23 members and 20 guests in attendance. The following three guests requested membership on the Working Group:

Mark Perkins
Craig Stiegemeier
Brent Hayman
As required in the IEEE Standards Board By-law, Section 6.3.2, the IEEE patent disclosure requirements were discussed and a request was made for disclosure of any patents that may be related to the work of the Working Group. There were no responses to the request for disclosure.

In the past, the Working Group had a difficult time agreeing on dissolved gas analysis (DGA) limits for the different design load tap changers. In view of the foregoing, it was decided to use “generic limits” of the combustible gases of interest for the various design types of load tap changers. A Task Force has been assigned to develop a generic description of each LTC.

Absolute values and ratios of the various combustible gases would be used in determining whether the DGA data is indicative of a tap changer problem. The ratios discussed were Ethylene/Acetylene, Ethane/Methane, and Ethylene/Ethane. The Ethylene/Acetylene ratio appears to be the most meaningful of the three ratios.

The Working Group reviewed Draft 7 at their meeting. The Working Group’s DGA database is manufacturer specific. Since IEEE bylaws do not permit categorizing tap changers by manufacturer, a Tank Force has been formed to look at the DGA database and will attempt to write up parallel descriptions of the LTC. This will allow the Guide user to be able to identify a particular manufacturer’s tap changer without actually naming the specific tap changer.

The Guide will have the following three categories for the DGA results:

A. Normal
B. Caution
C. Warning

The Working Group needs to define the three categories.

The comments received at the WG meeting in Jackson will be incorporated into Draft 8 which will be discussed at the next meeting in Memphis.

8.6.4.5 C57.146 – IEEE Guide for the Interpretation of Gases Generated in Silicone Immersed Transformers

This document previously carried the IEEE designation P1258. This has been changed to the IEEE designation C57.146 to be consistent with the other standards in the C57 collection.

Jim Goudie and Bill Bartley are the Working Group Co-Chairs of this project. A Standards Association Ballot was recently conducted. Two negative ballot was received. A Recirculation Ballot is now in progress. The Subcommittee expects to send the document to the IEEE Standards Board for approval after completion of the Recirculation Ballot.

8.6.4.6 C57.147 – IEEE Guide for the Acceptance and Maintenance of Natural Ester Based Fluids

Patrick McShane is the Working Group Chair. Clair Claiborne is the Working Group Co-Chair. The Working Group met on Tuesday, March 15, with 19 members and 42 guests in attendance. The following five guests requested membership on the Working Group:
A. Joe Kelly  
B. Rick Ladroga  
C. Ray Nicholas  
D. Dave Blew  
E. Juan Castellanos

The Working Group meeting was then called to order by the WG Chair, Patrick McShane. As required in the IEEE Standards Board By-law, Section 6.3.2, the IEEE patent disclosure requirements were discussed and a request was made for disclosure of any patents that may be related to the work of the Working Group. There were no responses to the request for disclosure.

The Working Group reviewed Draft 5.3 at their meeting. Most discussions were based on the tests and test values contained in Tables 2, 3 and 4. These tables are as follows:

A. Table 2 – Acceptable values for receipt of bulk shipments of natural ester fluids  
B. Table 3 – Test limits for new natural ester fluids received in new equipment, below 230 kV, prior to energization  
C. Table 4 – Suggested limits for continued use of service-aged natural ester fluids (grouped by voltage class)

The comments received will be incorporated into Draft 6 which will be sent to the Working Group and Fluids Subcommittee for a straw ballot.

8.6.5 Adjournment

The Subcommittee adjourned at 12:00 noon.

8.6.6 Next Meeting

The Insulating Fluids Subcommittee and its Working Groups will next meet in Memphis, Tennessee during the period of October 23-27, 2005.

8.7 Insulation Life

Minutes unavailable at time of printing

8.8 Performance Characteristics Subcommittee

8.8.1 Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met on Wednesday, March 16, 2005 with 60 members and 26 guests in attendance. 1 of those guests requested membership in PCS. See last page of these minutes for attendance summary.

8.8.2 Approval of Meeting Minutes

The minutes of the last meeting in Las Vegas were approved as written, except for one very minor change which was corrected.
8.8.3 Chairman's Remarks

8.8.3.1 Administrative Subcommittee Notes

- Next Standards meeting dates and locations are as follows:
  - Fall 2005: October 23 –27, Memphis, TN
  - Spring 2006: March 19 –23, (Tentative Location - Miami, FL)
  - Fall 2006: October 22 –26, Montreal, Canada
  - Spring 2007: March 11 –15, (Location – Yet to be selected)
  Deadline for submitting papers to this conference is April 11, 2005.
- We are considering the “Loss measurement and tolerances” Guide for Dual
  IEEE / IEC Logo.

8.8.4 Agenda Changes

None

8.8.5 Working Group and Task Force Reports

8.8.5.1 PCS WG for Continuous Revision to C57.12.90 – Bruce Forsyth, Chairman; Rowland James, Secretary

The PCS Working Group for Revisions to test code C57.12.90 met in Jackson, MS on March 15, 2005. There were 47 persons in attendance, 30 members and 17 guests. 6 guests requested membership in the working group. After introductions Bruce Forsyth announced his resignation from the Working Group due to work obligations and introduced Mark Perkins of ABB as the new Working Group chair. Robert Thompson moved, seconded by Subhash Tuli, to accept the minutes as written. They were approved unanimously.

Announcements
- Bruce Forsyth encouraged working group members to register for the Association Management System.
- Subhash Tuli reported that draft 3 of the revision to C57.12.90 will be sent out for balloting later this year.
- Bruce then reviewed with the Working Group IEEE’s Patent Requirements for Standards Under Development. Two slides provided by the Transformers Committee related to the IEEE’s Patent Policy were presented. Inappropriate topics for IEEE Working Group Meetings were identified. An opportunity was provided for WG members to identify or disclose patents that may be essential for the use of this standard. No responses were received.

Old Business

Review of comments from ballot of PC57.12.90/ D2
1. Alan Darwin commented that values for Kj frequencies above 1000 Hz should be positive, not negative. The Audible Sound and Vibration Subcommittee will correct this in the new version of section 13.
2. Lin Pierce commented that C57.91-1995 should not be listed as a reference because it is a guide and including it makes it a requirement. It was suggested that it be retained in the reference list which will be referred to Bill Chiu for consideration.

3. Lin Pierce also commented that clause 15 (Certified Test Data) should be a sub clause of section 8 of C57.12.00. The working group recommended no change.

4. Marcel Fortin made the following suggestions for Clause 12 (Short Circuit Testing)
   4.1. Clause 12.3.1 (note) – suggests ignoring source impedance is unrealistic for category II transformers, and recommends the following rewording:
   For Category I, calculate Isc using transformer impedance only; the symmetrical current magnitude shall not exceed the values listed in 7.1.4.1 and table 12 of IEEE Std. C57.12.00-200x. For Categories II, III, and IV, calculate Isc using transformer plus system impedance.
   4.2. Clause 12.5 – recommends adding DGA before and after short-circuit test.
   4.3. Clause 12.5.5 – recommends removing LVI tests because it is very difficult to duplicate readings.
   4.4. These issues will be referred to the Task Force that is reviewing the short-circuit test.

5. Mark Perkins made the following comments
   5.1. Clause 5.3.1 (Bridge method): Should be rewritten to update it since modern bridges use the voltmeter-ammeter method and only Wheatstone or Kelvin bridges should be considered bridge methods.
   5.2. Clause 5.3.2 (Volmeter-ammeter method): Recommends rewording to make the voltmeter-ammeter method the preferred method and discourage the bridge method.
   5.3. Modernize sentences about commutating machines
   5.4. Figure 1 should indicate a DC source, not a battery
   5.5. Suggests deflecting ammeters cannot meet the requirements of C57.12.00 Table 21 and should not be allowed.
   5.6. Mark will work on revising these clauses.

6. Pierre Riffon offered the following comments and suggestions.
   6.1. Clause 5.3.2.e): Questions the use of a potentiometer. Suggests a shunt and voltmeter should only be used when the current is too high. It was recommended to incorporate Mr. Riffon’s concerns in Mr. Perkin’s revision.
   6.2. Clause 12 (Short-circuit Test) – Mr. Riffon had several concerns regarding sections 12.2.1.1, 12.2.2.1, 12.2.3.1, 12.4.2, 12.5.4, 12.5.5. and suggested that DGA be added before and after tests. These issues will be addressed by the previously mentioned task force for short-circuit testing.

7. Don Platts commented on procedures and reporting resistance measurements.
   7.1. Most manufacturers report resistance as the sum of 3 phases but test data sheets report individual resistances. It was suggested that terminal-to-terminal resistance values be included on the Certified Test Report in addition to over all transformer resistance.
The procedure for measuring and reporting converted data should be clearly identified in this clause.

7.2. Some discussion regarding terminal pairs should be added here and possibly in Clause 11 also (e.g. wye, delta, autotransformer windings, etc.)

7.3. There were some discussions on wye-connected windings. Should the measurements be made at the X₀ bushing or at the neutral end of the wye connected windings? Another suggestion was to measure line to neutral and account for the neutral lead resistance for I²R measurements. The Working Group’s opinion is that the resistance measurement procedure shall be specified in C57.12.90.

7.3.1. The first step will be to clarify the connections required for resistance measurements.

7.3.2. The second step should be to specify in the standard the methods to measure resistance. The preceding discussion on resistance measurements concluded at the end of allotted time for this meeting.

Since time ran out, the remaining comments were tabled for review at a later time. The meeting adjourned at 10:45 am.

8.8.5.2 PCS WG for Continuous Revision to C57.12.00 - Steve Snyder, Chairman; Dennis Marlow, Secretary

The Working Group met on Monday, March 14 at 1:45 PM. There were 22 members and 42 guests in attendance, with the following 2 people requesting membership:

Kumar Mani Progress Energy
Loren Wagenaar American Electric Power

The addition of the two new members brings the Working Group membership to 62.

Following introductions, the minutes from the October 25, 2004 Las Vegas meeting were approved as submitted. The chairman then reviewed the IEEE patent disclosure requirements. No guests or members present indicated knowledge of any patent activity applicable to our work at this meeting. The Working Group then began discussing the topics of old business, as follows:

WG Item 54. C57.12.00 Table 19 and Section 8.2, request to add winding DC resistance measurements as a requirement for buried tertiary windings.

During the discussion on this topic it was pointed out that resistance measurements are required on all windings in accordance with the language in the existing document. There is no distinction between “buried” windings or windings with terminals brought out. The WG voted 30 to 1 to not change the present text.
WG Item 55, C57.12.00/D2 April 2002 Table 10, Note 9 Nameplate Information

Suggested change to note 9 – delete the phrase “on the winding assembly, or any tap changer” and replace with “inside the tank or inside the LTC compartment.”

The Working Group discussed the proposed editorial change, but with a vote of 16 for and 16 against, the decision was to not change the present wording.

WG Item 56, C57.12.00/D2 April 2002 Table 14, Note a, second sentence Incorrect sentence construction, with a possessive inanimate subject. Amend text to read “…limited only by the impedance of the transformer.”

This is an editorial change, and the WG expressed no dissent in accepting the proposal. The new sentence will read “Two winding distribution transformers with secondaries rated above 600 V should be designed to withstand short circuits limited only by the impedance of the transformer.”

WG Item 57, C57.12.00/D2 April 2002 Section 5.10.2.4 Insulation level of the neutral bushing, request to change the requirement for the neutral bushing to be equal or greater than the neutral end of the winding.

This topic was exhaustively discussed with various views expressed about the origin of the present language. Dennis Marlow indicated in his experience some utilities may require that the neutral be suitable for ungrounded operation or for future grounding via a neutral reactor. The user would have a suitable “spare” bushing available and thus specified a lower BIL bushing be shipped with the transformer. After further discussion and two indecisive votes, the WG finally agreed by a vote of 36 to 2 to accept the revised requirement. The new wording for this section will become:

“The insulation level of the neutral end of a winding may differ from the insulation level of the neutral bushing being furnished or of the bushing for which provision for future installation is made. In any case, the insulation level of the neutral bushing shall be equal or greater than the specified insulation level of the neutral end of the winding.”

WG Item 58, C57.12.00/D2 April 2002 Table 19, Routine, design, and other tests for liquid-immersed transformers. The request is to revise and expand this table to specifically spell out the requirements between Class I and Class II power transformers by adding a third set of three columns; the first set staying as it is, the second set headed “501 kVA and above, and Class I power transformers”, and the third set headed “Class II power transformers”. The routine design and other cells within the last two categories would then indicate the appropriate test on the basis of the present table and the notes. This would eliminate five of the notes and simplify reading of the table.

The Working Group agreed that this would simplify and make the table more understandable. The chairman will accordingly revise the table with changes noted and present this to the WG for comments prior to the next meeting.
WG Item 59, C57.12.00/D2 April 2002 Section 7.1.4.2, request to change the standard to include source impedance in the short-circuit testing of category II transformers. This product classification is distribution transformers, and since few distribution transformer users or manufacturers were represented in this meeting, it was decided to defer discussion on this item until input was received from the proper audience.

8.8.5.3 WG on Loss Tolerance and Measurement - Ed teNyenhuis, Chairman; Andy Steinemner, Secretary

- 19 members and 16 guests attended, with 3 guests (William Boettger, Bill Griesacker and Kumar Mani) requesting membership.

- Minutes from the Las Vegas meeting held on Oct 26th, 2004 were read and approved.

- IEEE Patent Policy - The policy was reviewed by the WG and an opportunity was provided for WG members to identify or disclose patents that the WG member believes may be essential for the use of that standard. No responses were given.

- Report on TF for “Guide of Low Power Factor Power Measurements” was given by Ernst Hanique for Eddy So. The review of the guide by the National Research Canada (NRC) has been completed. A PAR will now be requested from PSIM/PMS, after which it will be put to a ballot.

- Frequency Conversion Factors of Transformer Performance Parameters - The wording for C57.12.00 and C57.12.90 was put to a survey in PCS and 10 survey responses were reviewed in the WG. Below are the resulting changes that were agreed upon by the WG:
  - Keep the comment in C57.12.00 that the customer should know that the frequency conversion factors will be used at “the tender stage”
  - Add examples for each of the frequency conversion factors
  - The examples should be revised as follows:
    - Add the voltage to be used to the no load loss conversion factor example
    - State more clearly the separation of the eddy+stray losses in the load loss conversion factor example
  - Change the exciting current conversion factor wording to “there is no conversion factor” since the factor is 1.00
  - Change “can” to “shall” in the C57.12.00 wording in order to strengthen the use the frequency conversion factors
  - Add a comment in the temperature rise conversion factor that $P_0$ is measured at 50Hz and converted to 60Hz
  - There was a response on the validity of the sound level conversion factor due to the variability of the measurements in the paper. While it is true that the measurements were somewhat variable, there was already strong text put in the wording such as comments on resonant frequency, recognized greater uncertainty and the final possible request by the customer to measure the sound at the site. Thus, it was agreed to keep the wording as it was.
Chairman to check what is the liability of IEEE standards if for example the frequency conversion factor for sound level is used and the measured sound level at site were to be greater than the guaranteed value.

The location of the text will be moved from the main body of C57.12.90 to a Normative Annex since it will not be used that often and it will unnecessarily add bulk to the main text. The chairman will revise the wording into a normative annex.

Revise “at the tender stage” in C57.12.00 to “at the tender stage or prior to a contract”

Add comment in short circuit tests: “For large power transformers, it should be considered that mechanical resonances in the windings in the 120Hz range may impact the measured results”

Add a comment in C57.12.00: “The purpose of the frequency conversion factors is have uniformity amongst the manufacturers when such cases arise that measurements cannot be done at rated frequency”

Change wording in audible sound emissions from “The correction factor for ONAN or No Load Sound level (50 to 60 Hz) shall be + 3.6 dB” to “The corrected sound level for 60Hz equals the measured ONAN (no load) sound level at 50Hz plus 3.6 dB”. Change also “Similarly, the 60 to 50Hz frequency conversion of sound level shall be the negative value of the above mentioned 50 to 60 Hz value” to “Similarly, the corrected sound level for 50Hz equals the measured sound level at 60Hz minus 3.6dB”

Due to the fact that wording will now be put into a Normative Annex, it was agreed to put the wording out to a PCS survey one more time. The responses will be reviewed at the next WG meeting.

Old Business – The WG reviewed suggested topics for future meetings:
- Investigate the errors in the temperature rise measured values due to corrections and assumptions – This is being handled by Insulation Life SC.
- Overload test at different frequencies – It was agreed that this would be handled at another temperature rise test and the same conversion factors would be used.
- Zero sequence impedance – This is being handled already by the WG for C57.12.90.
- Investigate the total error for load loss in all corrections due to temperature and other factors – This has already been covered in the C57.123 Loss Measurement guide

New Business –
- C57.123 will need to be reaffirmed by 2007. The WG should start to review the guide and any required changes in 2006

8.8.5.4  **WG on Switching Transients Induced by Transformer / Breaker Interaction, PC57.142,WG - Robert Degeneff, Chairman; Peter Balma, Secretary**

The Working Group was called to order at 8:03 AM on March 15, 2005. There were 69 attendees, 32 members, 1 requesting membership, and 36 guests. After introductions, the Minutes from the October 26, 2004 meeting in Las Vegas, Nevada were approved. Copies of the minutes were distributed.
1. IEEE patent policy was reviewed and the group was asked if there were any disclosures. There were none.

2. The Switching Transients Interaction Guide was sent to IEEE editors for review, and comments were received back on March 11, 2005. Most of the comments were minor and will be addressed before the ballot version is distributed.

3. A ballot pool has been requested, however, it was done under the old system. Bill Chui suggested that the ballot pool be re-established utilizing myBallot™. It was agreed that this would be done, and all members were asked to reconfirm their participation in the myBallot™ system. It is anticipated that the document will be in the hands of the balloters by mid to late April.

4. Bob Degeneff and Sam Mehta will make a presentation of this group’s work to the CIGRE SC A2 Committee at the Colloquium to be held in Moscow in June.

5. Under old business the group was asked if it should continue its efforts, by investigating back-feed energization of transformers. It was determined that the group should complete its current effort to ballot and publish this guide, and only then, to consider this activity as a new guide or revision to the guide just prepared.

   Ramsis Girgis, asked that the group if anyone knew the history of a group that considered back-feed approximately 20 years ago? It appears there was a group which discussed resonances within transformers, but no one was aware of a group that specifically addressed back-feed situations. Ramsis further inquired of the group was anyone familiar with examples of difficulties in this area. Two events, one recent and one historical, were described indicating problems of this type, and some of the steps taken to mitigate them.

6. Under new business Mel Smith of the Switchgear Committee asked the working group if any progress had been made in determining the typical resonant frequencies of transformers. The Switchgear Committee would like to utilize this information to determine transient recovery voltages (TRV), and would like to work with values representative of transformers currently in service. The only data available to the switchgear committee has become aged, and needs to be updated.

   One area of particular interest to the Switchgear Committee is the application which requires a breaker located close to a transformer to clear a fault on the line close in to the transformer.

   Ramsis Girgis suggested two presentations be made at a future meeting (possibly New Orleans T&D meeting) to facilitate understanding of the data required. The first should be a discussion by the Switchgear Committee of the data they need and the recovery voltage they are calculating, and the second, should be a discussion of resonances within transformers.
The W.G. met in the Amphitheater 1 Meeting Room of the Hilton Jackson Hotel in Jackson, Mississippi on March 14, 2005 from 11:00 a.m. to 12:15 p.m. There were 10 members and 7 guests present. The following are highlights.

1. The minutes of the W.G. meeting in Las Vegas were approved.

   NOTE: The minutes of the Jackson W.G. meeting will not be formally approved until the W.G. meeting in Memphis, Tennessee.

2. IEEE patent policy as related to standards development was reviewed; details can be found on the IEEE Transformers Committee website. Attendees were asked if they knew of any patents that would impact the implementation of the revision of IEEE C57.21. None were noted.

3. Draft #3, prepared by the Chairman, of the revision of IEEE C57.21 was discussed. The following are the highlights.

   (i) It was decided to use in Table 5 and throughout the document “rated/nominal” voltage and “maximum voltage”.

   (ii) Other changes to Table 5 were agreed to. The maximum system voltage for nominal/rated 500 kV systems is 550 kV (10% of nominal/rated). For tertiary connected SRs 69 kV and below the maximum tertiary voltage should be 5% of nominal/rated or should be specified. Note the tertiary voltage, although at distribution voltage levels, is a function of the transmission system voltage and transformer characteristics. The notes associated with Table 5 should reference the specific columns in Table 5.

   (iii) In the revision of IEEE C57.21 it was agreed that the audible sound test will be performed at maximum voltage at the end of the temperature rise design test versus at nominal/rated voltage per IEC 60076-6 (revision in process). A NOTE will be added to stress that if the audible sound design test cannot be performed at maximum voltage due to test lab limitations, the manufacturer must inform the end user at the bid stage.

   (iv) Note 7 of Table 5 should be modified. If the induced test level enhancement of 1.7 cannot be met due to test lab limitations then the “end user” should be informed by the manufacturer at bid stage. This test should be carried out at as high a level of enhancement as possible.

   (v) Clause 10.3.9.4.2.2 defining the switching impulse across the SR should be modified. If the specified waveshape cannot be achieved then the manufacturer should inform the “end user” the waveshape possible at the design review or final electrical design stage.
(vi) Current IEEE designations will be used for the methods of cooling of oil-immersed SRs. Pierre Riffon will provide a draft.

(vii) Clause 7.1.2 which describes loss limits will be revised based on the text in IEEE C57.16. Commercial versus technical issues will be defined. If losses exceed the guaranteed value the main technical issue to be assessed is the impact on expected temperature rise versus temperature rise limits. The Chairman will redraft this clause.

(viii) Clause 9.1.3.1 will be redrafted by Pierre Riffon to make it consistent with the combining of Tables 5A and 5B in the current version of IEEE C57.21 into one table in the current revision; Table 5.

(ix) It was agreed to keep determination of magnetic characteristics (linearity) as “other test” in Table 4A.

(x) The audible sound test should be performed at “close to operating temperature” versus the current wording “at operating temperature”. Table 4A and text should be so modified.

The Chairman agreed to produce Draft #4 well in advance of the Memphis meeting.

8.8.5.6 WG for Revision of C57.110 – IEEE Recommended Practice for Establishing Liquid-Filled and Dry-Type Power and Distribution Transformer Capability When Supplying Non-Sinusoidal Load Currents – Rick Marek, Chair; Kent Haggerty, Co-Chair

The meeting opened with introductions at 1:45 PM. There were 16 members and 7 guests present. 4 attendees requested membership on the WG.

The group was referred to the IEEE patent information and the group was requested to identify or disclose any patents. There was no response. The minutes from the Las Vegas meeting were approved with one minor correction that will be submitted to the SC Chair.

The group was informed that on November 18, 2004, the IEEE-SA Standards Board approved the PAR, until December 31, 2008. An objection to the PAR was resolved by adding the phrase “Liquid-Filled and Dry-Type Distribution and Power” before the word “Transformer” in the title.

Access to the new C57.110 website was demonstrated and the posted files were discussed. The group was encouraged to download the files of interest, since the posting will be for only a limited time. Space on a second password protected website has been assigned by IEEE, specifically for C57.110 activities. The chair will evaluate this second site to determine how the group can take best advantage of the two.
The chair noted that draft 1 is progressing very slowly and that the whole document requires re-formatting to match the latest Styles Manual. The formulas will require the most work and there are many formulas in this document. One or two volunteers were also requested to assist in editing. They would be called on only if necessary. Anyone interested is requested to contact the chair directly.

Three members submitted comments to a request for a complete document review at the last meeting. Discussion on a suggestion made by Subhas Sarkar was delayed until the next meeting, since he was not present. John Sullivan’s list of editorial comments were accepted as submitted, except for two items. The first was a request for clarification to paragraph 5.3, titled “Power Factor Correction Equipment”, since capacitors are never mentioned. After some discussion, it was agreed that the paragraph should be re-written to include power factor correction capacitors.

The second item of discussion concerned note 7 of the document and whether the wording was sufficient, since utilities are exempt from NEC and local codes. The chair agreed to review the note with John’s assistance, if necessary.

Mahesh Sampat presented an analysis of the effects of current harmonics on core loss. The analysis referred to the testing of several units comparing identical coils using silicon and amorphous core steel, concluding that there was a significant effect. Ramsis Girgis, having previewed the analysis, presented an explanation of the higher losses. This was followed by a discussion and the conclusion that additional equations should be added to the document. However, the complexity of these equations will be determined as the revision progresses.

Don Duckett asked if frequency response analysis had been used to determine a transformer response to harmonics. He referenced a study that included the testing of a number of transformers. Don was requested to provide the chair with contact information to see if any additional information could be provided to the WG.

All members and guests were reminded to continue to identify any technical papers or books that would be appropriate for addition to the Bibliography. The group was also reminded to provide document review comments, updates on the abstract and introduction and additional wording on neutral heating due to third harmonics.

8.8.5.7 TF on Semi-Conductor Rectifier Transformers, C57.18.10 – Sheldon Kennedy, Chairman

The Task Force met on Monday, March 14, 2005 at 3:15 PM with 14 members and 6 guests present. Sheldon Kennedy chaired the meeting.

The IEEE disclosure statement was read. There were no patents pertaining to this standards work for which any members had awareness.

The minutes of the October 2004 meeting in Las Vegas, NV were approved.
The Chair announced that the PAR had been approved, but as an Amendment PAR, not a Corrigendum PAR, as originally submitted. Due to the fact we were adding some definitions that were missing; we could no longer do the work under a corrigendum, even though we were correcting some other errors.

Comments received during the reaffirmation of C57.18.10 required action to resolve the negative votes received. We are correcting the errors and missing or undefined terms. Technical comments will be worked on during a full revision process following the amendment revision.

Items from the comments for editorial corrections received during the reaffirmation were reviewed. The Chair volunteered to make all of the editorial corrections that were noted, including the missing or erroneously labeled technical terms. Rick Marek volunteered to submit proposed definitions to the working group for the terms $E_z$, $P_a$, $P_b$, and $P_c$.

During the working group review it was noted that the comments received were from the PDF copy of the standard. When the chair was reviewing this with the hard copy it was found that there were differences in the two. One reviewer had commented that the standard lists Figures 4 through 7 for circuit diagrams; while in reality the Figures were numbered 4 through 9. Somehow, the PDF copy differed from the hard copy, which was correct. There were two pages of Figure 5 and Figure 5 Continued, as well as Figure 6 and Figure 6 Continued. These were renumbered to Figures 5, 6, 7 and 8 by someone in IEEE. Then the preceding Table 7 was renumbered to Table 9 by IEEE. Figures 5 and 6 are long and show as continued purposely as they group types of circuits together. This is the same as it was for the preceding standard for mercury arc rectifier transformers, ANSI/IEEE C57.18, which was replaced by this standard.

Similarly, it was noted that Annex A has Tables A.1, A.2, A.3, A.4, and so on. In the hard copy there is an error in that Table A.1 is labeled Table A.11, even though there is another Table A.11 later in the Annex. Perplexing is that the PDF copy also labels Table A.1 as Table A.11; and additionally labels Table A.2 as Table A.12, and Table A.3 as Table A.13. Again the PDF and hard copy are different.

It was suggested that the Chair request guidance from the Subcommittee Chair and other Committee officers on how to proceed with this. As the document is in an amendment revision it is assumed we will make these corrections along with the others. Rick Marek had suggested that when he found differences in C57.110 between the hard copy and PDF, that IEEE made the corrections on their own, without it being done in his corrigendum revision. The Chair will seek guidance on this.

This concluded all of the comments that were included in the amendment revision. The corrections and additions will be circulated to the working group as a survey. If this is successful, the Subcommittee will be surveyed.

New technical comments were received and discussed, but these will be tabled until the full revision process. These were by Ray Nicholas on the correctness of having Table 11 in the standard which gives a conservative default harmonic spectrum table which may be proposed to a user if he has no information. Ray
felt it was too conservative, as did others, but it is meant to be conservative. This will be revisited at the time of the full PAR. Ray also had some comments on thermal testing that will be discussed in more detail when we do the full revision PAR.

There were no further comments.

8.8.5.8 WG on Neutral Grounding Devices, PC57.32 – Steve Schappell, Chairman

The working group met at 9:30 a.m. on Tuesday, March 15, 2005, with 16 in attendance. There were 7 members in attendance and 9 guests. One of the guests requested membership and will be added.

The roster was handed out and introductions made. The group was asked if there was any knowledge of any patents that may be essential to the implementation of the Standard. There were no responses regarding this issue.

The current status of the document was discussed and it was noted that the PAR expires in December 2006. A ballotable draft of the Standard is needed by Fall 2005.

An email from Richard Dudley addressing changes that needed to be made to Table 1 (Limits of Temperature Rise for Neutral Grounding Devices) of the Standard, with reference to previous work on related IEEE documents (C57.16 and C57.32), was reviewed with the group. There was a discussion regarding these possible changes. It was stated that based on the duty requirements for neutral grounding devices that it may be appropriate to increase the average temperatures as stated in Table 1. There was discussion that much higher temperatures than Table 1 are typically acceptable for resistors due to the materials used for their construction. It was agreed that Table 1 should include temperature ratings applicable to three separate items: Item 1 – Dry Type, Item 2 – Oil-filled, and Item 3 – Resistors. Richard Dudley volunteered to work on a revised draft of Table 1 to be submitted to the working group for review. It was indicated that efforts made by both Peter Balma and Steve Schappell to solicit input from several resistor manufacturers had thus far been unsuccessful. Peter and Steve indicated that they would continue these efforts, particularly with respect to the temperature ratings to be included in the revised Table 1.

A handout of an excerpt from IEC 60076 dealing with Earthing Transformers was supplied by Richard Dudley and Christoph Ploetner as reference material for revising this IEEE Standard. Input was received regarding how to appropriately acknowledge in the Standard that we were permitted by IEC to use the material for reference purposes as well how to appropriately incorporate information from the IEC document. It was noted that there is also an annex to this document relating to resistors that may be reviewed as well. It was also noted that the IEEE document would continue to use the term grounding transformer rather than earthing transformer as used in the IEC document.

The question was raised as to whether there were cases where dry-type grounding transformers were manufactured for indoor applications. The response was affirmative.
There was some discussion as to the use of resistors or reactors in the neutral of a grounding transformer, either inside the tank or mounted on/adjacent to the tank. The appropriate approach by which to assign a nameplate rating for such a case was discussed. This discussion included differences in the definition of rated impedance between IEEE and IEC documents for such a case, specifically that for certain cases based on IEC definitions a combined rated impedance could be used where a grounding transformer and resistor or reactor were supplied together. The suggestion was made that to be consistent with typical practice among US suppliers and users the basic definition for rated impedance should use the definitions as currently stated in the IEEE Standard for each device separately and to nameplate the device or devices as such, not as a combined quantity. The suggestion was also made that additional tutorial-type information may be needed regarding how ratings are defined and what kind of system related information should be considered when selecting a rating.

8.8.5.9 PC57.149 – Guide for the Application and Interpretation of Frequency Response Analysis for Oil Immersed Transformers – Chairman; Charles Sweetser

WG PC57.149 met for the development of a guide for Frequency Response Analysis (FRA) in Jackson, Mississippi on March 15, 2005 at 3:15 P.M. There were 35 persons in attendance, 17 members and 18 guests of which 4 guests requested membership.

The FRA Working Group meeting was called to order at 3:15 PM.

The first order of business was to show the two slides regarding patents and inappropriate behavior.

The minutes from the last meeting were presented and approved without comment.

The Working Group chair presented a brief report on what had been done in the last six months. The latest contributions were identified and discussed. The major contributors were Mark Perkins, Roger Verdolin, and Charles Sweetser. This meeting focused on three out of the six section, Section 1: Scope and Application, Section 3: Making a FRA Measurement, and Section 5: Analysis and Interpretation. Each of these sections was then discussed.

- **Section 1: Scope and Application** – Mark Perkins and Roger Verdolin provided the first draft of roughly 20 definitions. The FRA Working Group reviewed this work. It was recommend the definition for the impulse voltage method be shortened and any additional descriptions be moved to Section 3. Any references to voltage or current as measured signals needs to be replaced by "reference" and "measure", so not to create confusion among various test methods. Definitions 1.2.6 to 1.2.9, regarding test configurations and measurement type, produced some confusion within the FRA Working Group. It was agreed upon that these items need to be better defined. These four definitions will be edited by the original authors.

- **Section 3: Making a FRA Measurement** - The Working Group Chair proposed questions for a general consensus. The results are as follows:
1. **Recommendations for LTC Position** – The Working Group agreed the LTC recommendation will be on one tap position, Extreme Raise. However, text will be added recommending additional tap positions for unique circumstances.

2. **Recommendations for DETC Position** – The recommendation is the nominal tap position unless otherwise specified by the end user.

3. The four measurement types, Open Circuit Self-Admittance, Short Circuit Self-Admittance, Inter-Winding, and Transfer Voltage were presented. These four measurement types cover all known test applications. No other additional measurement types have been brought the FRA WG’s attention. Richard Breytenbach and Jeff Britton offered to provide connection diagram for each of these types.

4. The test connection table will have the terminal designations replaced with phase designations. Example: H1-H3 will be replaced with HV PHASE A. A caution note on phase polarity will be added. The end user needs to establish a polarity convention since reversed polarity connections produce different results.

- **Section 5: Analysis and Interpretation** - The FRA WG agreed that this section is in poor condition. Charles Sweetser provided a new outline for review. The outline included topics such as analysis strategies, relation to other diagnostic tests, failure modes, and modeling. The FRA WG would like to see work done in the area of computer modeling analysis. This analysis should be applied to various transformer designs to see how the results compare to actual measurements. Ramsis Girgis and Bob Degeneff expressed interest in this subject.

The topic of transformer natural frequencies was raised. This discussion was a continuation from comments made in the Switch Transients Induced by Transformer/Breaker Interaction Working Group PC57.142 meeting. Mel Smith of the Switch Gear Committee attended both meetings, Switching Transients and FRA. He asked if the FRA measurement could be applied to determine major resonances. However, his request requires a unique test procedure that has not been done on a routine basis. Mel Smith and Charles Sweetser agreed to collect data and report any findings to Working Group PC57.142 and Working Group PC57.149

Charles Sweetser provided a few comments regarding the status of the CIGRE FRA Working Group A2.26. The CIGRE FRA Working Group A2.26 guide will consist of two sections, Introduction to FRA for New Users and Guide to Interpretation of FRA Results.

The general deliverables and time schedule of CIGRE FRA Working Group A2.26 are:

- Intermediate report for circulation within SC A2 - May 2005
- Final report as CIGRE report or Brochure - December 2006

**8.8.5.10 Core Overexcitation TF – Craig Steigemeier, Chairman**
The third meeting of the Core Over-Excitation Task Force took place at 8:00am on March 14th, 2005. This Task Force is charged with the identification of limits for core over-excitation and coming up with suggestions for modification of appropriate standards. There were 61 total attendees, of which 37 were members and 24 guests. Nine (9) attendees requested membership and will be added to the TF member roster.

At the beginning of the meeting, the reminder of the need to adhere to the IEEE patent policy was stressed and the chair asked for anyone aware of patentable situations to bring it before the group. Also, the hotel’s WiFi capabilities were noted. No one offered the chairman suggestions during or after the meeting of patentable work or identified any inappropriate topics covered during the meeting.

The suggested changes to C57.12.00 (IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers), Section 4.1.6 (Operation above rated voltage or below rated frequency) covered previously were briefly reviewed for the benefit of the 24 attendees that had not attended previous meetings of the TF.

Detailed discussions were held concerning the suggestions made during the fall (Las Vegas) meeting. The following are those suggestions, and the comments & recommendations made during this meeting:

- **Instead of using 130°C, use the 90°C rise over the 40°C ambient for clarity**
  - To keep the understanding of core hotspot heating simple, the absolute temperature limit will be used
  - It was agreed that an explanation should be included that notes that the calculation for the hotspot is unique and different from the core surface temperature. The core hotspot occurs in an area where there is only a thin film of oil while the surface heating is more typical of metallic heating in the vicinity of bulk oil.
- **Address core hot spot when overexcitation occurs in lightly loaded situations**
  - It was noted that the core hotspot temperature is much lower at lighter load, since the oil bath temperature is low.
  - The design will always be limited by the core hotspot when the transformer is under full load.
  - It was decided that it is not necessary to address hot spot at light load.
- **Consider the core formula in IEC standards**
  - We could not determine the basis of this comment.
  - IEC does address overvoltage conditions on the primary side of the transformer
  - IEEE/ANSI defines overvoltage on the secondary.
  - The overvoltage conditions covered under this Task Force’s recommendations will be consistent with IEEE/ANSI standards.
- **Refer to C57.116 for consistency – both in terminology and details like power factor**
  - Relevant terms in C57.116 will be used in the final recommendation to the Performance Characteristics Subcommittee.
- **Consider using a curve for temperature/overexcitation (attendees will send Chairman examples/suggestions)**
  - It was decided that since the temperature/overexcitation curve is specific for a given design, it would not be appropriate to utilize a curve in a
standard. If a guide is developed, then a sample curve could be appropriate.

- In addition to the GSU and system tie transformers, consider adding a third category for “other” transformers that are designed only for step-down operation
  - Stepdown and autotransformers should be the same as all that’s required is the maximum voltage impressed on the transformer. Thus, there is no need for a separate category.
  - It was noted that IEC standards refer to the voltage impressed on the primary of the transformer, while IEEE/ANSI standards refer to the voltage at the secondary terminals of the transformer.

- Ensure consistency in the use of rises versus absolute temperatures
  - As the first point noted, the need for consistency and a clear understanding of the gas generation mechanism drives the decision to stay with an absolute temperature limit to be observed that will lessen the opportunity for significant gassing.

- Address boundary conditions - such as number of fans in operation and material
  - It was noted that boundary conditions determine the value of the temperature rise of the oil for a specific design
  - Transformer manufacturers must take all design and operation parameters of the transformer into account when making the core temperature calculations
  - Users must clearly identify the boundary conditions related to site and system parameters
  - The assessment of detailed boundary conditions will be avoided in the wording as these conditions are too varied to be covered in specific detail in a general standard.

- Develop and include a core hot spot calculation similar to the winding hot spot calculation
  - It was agreed that a definition of the core hot spot temperature was needed.
  - The definition offered was: Maximum Core Hot Spot Temperature = Maximum Ambient temperature + Temperature Rise of oil around the region of the core Hot spot at full Load + Core Temperature Rise at maximum core excitation at full Load.
  - The temperature rise calculation would need to vary by the specific type of construction. For example:
    - For three phase, three limb, Core Form Transformers, the suggested method of calculation of Temperature Rise of oil around the region of the core Hot spot is as follows: Temperature Rise of ambient oil = 7/8 * TOP OIL RISE + 1/8 * BOTTOM OIL RISE.
    - For cores where the core hot spot is located at the top of a wound limb, the temperature rise of the ambient oil will need to be equal to that used in the calculation of the winding hot spot temperature.
    - For Shell Form transformers, the temperature rise of the ambient oil will need to be calculated for the oil at the inside of the phases at the top of the core

- It was decided that the loss of life table in C57.91 should not be modified to include a line addressing core overexcitation.
  - The table primarily addresses loss of life.
- There is a need to note that the generation of hydrogen should be avoided.
- A clarification sentence is needed to differentiate between core hotspot temperatures and the limitations of core surface temperatures.
- The differences between thin oil film trapped between laminations and bulk oil available at the surface of the core must be made clear to the standards user.
- The use of “over excitation” should be reviewed
- The Task Force felt that excitation values within the range of normal limits should not be termed “over excitation.”
- The term “maximum excitation” may be useful in defining excitation that is at the upper limit of the normal range of core excitation.
- Consider setting induction limits, but must consider core material and construction
- The meeting attendees agreed that this is outside the scope of the core overexcitation task force, but that it is an important topic that should be considered
- This will be noted for Performance Characteristics Subcommittee consideration.
- The DGA Guide (C57.104) does not presently address the mechanism of H2/CH4 gas generation due to core overheating
- It was suggested that wording should be included to address the mechanism of production of H2 and CH4 that is produced at low rates per day with a 6-8 ratio.
- This characteristic would likely be the result of moderate core overheating that would not be harmful to the unit, but which may confound or confuse the analysis of future gas samples and diagnosis of unrelated problems.

In general, most attending seemed to prefer to keep the modifications as simple as possible, while coming up with something adequate to address concerns over the adequate handling of overexcitation situations.

After incorporating suggestions from this meeting, the Chairman will set up a web meeting and review the suggested text with a volunteer group including representatives from the following 4 manufacturers and 10 utility/consultants:

Peter Balma – Public Service Electric and Gas Company
Stephen Beckman – Fort Pierce utilities Authority
Enrique Betancourt – GE Prolec (volunteered after meeting)
Donald Chu – ConEd
Peter Heinzig – Siemens
Rowland James – Entergy
Bipin Patel – Consultant
Ed teNyenhuis – ABB
Subhash Tuli – Waukesha Electric Sys
Dieter Wagner – Hydro One

8.8.6 Project Reports

8.8.6.1 Measurement of “Zero Sequence Impedance” for transformers with interconnected windings – Ramsis Girgis
A group of six PCS members met to review and confirm accuracy of the method suggested by Gerry Roselli and develop appropriate text to describe the test for implementation in C57.12.90. This text will be finalized in the fall meeting of the WG. Mark Perkins, who is now the leader of the C57.12.90 WG, will have the responsibility for this group.

8.8.7 Old Business

None

8.8.8 New Business

The Chairman will recruit the original leaders of the groups that developed C57.105 (Transformer Connections) & C57.109 (Thru – Fault Current Duration) to lead the effort of reaffirming these two documents, since these need to be sent for affirmation this year.
## Attendance at this Jackson Meeting

### MEMBERS

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### GUESTS

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*Guests requesting membership
8.9 POWER TRANSFORMERS – TOM LUNDQUIST, CHAIRMAN

The Power Transformers Subcommittee met at 1:30 pm, on Wednesday, March 16th with 55 members and 54 guests. 9 of the Guests requested membership.

The minutes from the Las Vegas meeting were approved with no changes or corrections.

The chairman asked if anyone was aware of any patent conflicts, none were voiced.

Requested backup for secretary position.

8.9.1 WORKING GROUP AND TASK FORCE REPORTS

8.9.1.1 TASK FORCE FOR REVISION OF C57.17, REQUIREMENTS FOR ARC FURNACE TRANSFORMERS – Dominic Corsi, Chairman

Meeting was cancelled.

8.9.1.2 WORKING GROUP FOR DEVELOPMENT OF PC57.143, GUIDE FOR APPLICATION OF MONITORING TO LIQUID IMMERSED TRANSFORMERS AND COMPONENTS- Donald Chu and Andre Lux, Co-Chairmen

Meeting Minutes for Working Group on PC57.143 Transformer monitoring. 9:30 AM March 14, 2005 Jackson MS
Acting Chair - Tom Lundquist

• 18 members, 37 guests were in attendance with 4 requests to become members.
• Patent issue was mentioned with no one presenting an issue.
• Minutes from prior meeting were approved.
• No discussion was held on the draft document.
• 4 people volunteered to become secretary to provide an active backup for meetings.
  o Remi Pages – requesting membership
  o Luiz Cheim – requesting membership
  o Tony Pink
  o Terrance Martin – requesting membership.
• Discussion of another TF group meeting during the Doble conference was opened and a list of 12 people indicated interest in such a meeting. This information will be passed on to Don Chu the chair for planning.
• A short presentation of an ESKOM paper on advantageous of monitoring transformer fault gas was presented by Stan Lindgren following the discussion and a request by Luiz Cheim was granted to present a discussion of transformer evaluations.
• The meeting adjourned at 9:50.

8.9.1.3 WORKING GROUP FOR DEVELOPMENT OF PC57.148, STANDARD FOR CONTROL CABINETS FOR TRANSFORMERS – Joe Watson, Chairman

The working group met at 11:00 a.m. on Monday, March 14, 2005, with 29 in attendance. There were 13 members in attendance and 16 guests. None of the guests requested membership. Working group chair Joe Watson was unable to attend so working group vice-chair Steve Schappell led the meeting with Scott Digby filling in to keep the minutes.
The roster was handed out and introductions made. Copies of Draft 3 of the Standard, which had been previously e-mailed to working group members, were available at the meeting. The minutes from the previous meeting were approved without comment. The group was again asked if there was any knowledge of any patents that may be essential to the implementation of the Standard. There were no responses regarding this issue.

A note from Joe Watson was reviewed indicating his disappointment in the participation from the working group members, citing a lack of input for Draft 3. It was noted that the PAR for this working group requires a much more complete draft of the Standard by the Memphis meeting in Fall 2005.

The scope and purpose of the document were reviewed. It was noted that significant time during the last meeting was devoted towards the construction of the actual cabinet and that the working group now needs to focus on the details of the modular designs for layouts and components stated in the purpose. It was noted that several manufacturers had submitted “standard” cabinet layouts/designs and that circuit and cabinet layout diagrams still need to be added to the draft based on the information received.

Another note from Joe Watson was reviewed suggesting that the system designating the cabinet type code based on transformer type may not work well with the draft in its current form but that 3 to 4 layout versions that a user may select from may be a better approach. This prompted some discussion to reduce the cabinet types referenced in the table in Section 8 with the conclusion being to simplify to two basic types, non-LTC and LTC, with no reference to cooling classes. An ONAN transformer would simply have the same basic layout as an OANN/ONAF transformer only without that added cooling equipment, and similarly for OFAF. This proposal was later voted upon and approved 15 to 1.

The question was raised as to the general feel for the modular concept. Input was received that standard terminal point designations, and general location of items within the cabinet would be very helpful to users in making user’s interface less manufacturer dependent, however, exact dimensional locations may not be explicitly necessary. It was also stated that a similar approach had been used within the circuit breaker standards group and that IEEE C37.11 could be reviewed.

A comment was made that this Standard should reference the specific wire that should be used for certain applications within the cabinet (i.e., CT wiring, power circuits, etc.), including the wire gauge and wire insulation. Another question was raised as to whether color-coding should be required or not.

There were discussions regarding the ratings of the specific components listed in Section 5.

It was recommended to reduce power terminal block rating requirement for voltage and current rating to 1.25 times the auxiliary power voltage and maximum auxiliary power load current (from 2 times).

It was recommended to restate circuit breaker ratings listed within section 5.4 to state that: “Circuit breakers should be coordinated with the load, accounting for motor starting inrush, etc”, leaving it as manufacturers responsibility to properly size the breaker according to application.
The section on contactors may need to be broadened as there are other devices that are not NEMA type devices that will perform the same function adequately. Should NEMA or IEC contactors be required, or dual-rated? There was a call for volunteers to complete this section but no one came forth.

It was noted that the 4-hole bolt pattern requirement for switches would disallow certain switches that may be acceptable for certain applications and the recommendation was made to delete this requirement.

For the section on Heaters, Cabinet Fans, Ventilation and Drains, there needs to be a provision or option for deletion of heaters or vents for certain applications since certain applications may disallow such features (ex. NEMA 4X enclosure). There was also a request for some guidelines regarding heater application, such as recommended watt density ranges. Such recommendations could be tied also to the specific climate, possibly referencing 2 or 3 difference climates.

Some sample cabinet layout drawings (a non-LTC set and an LTC set) were passed out as reference material.

It was stated that any additional comments be referred to Joe Watson or Steve Schappell.

Meeting adjourned at 12:15.

8.9.1.4 WORKING GROUP FOR DEVELOPMENT OF PC57.131, STANDARD REQUIREMENTS FOR TAP CHANGERS - William Henning, Chairman

The Working Group on LTC Performance met on Monday, March 14 with 16 members and 31 guests present.

At the beginning of the meeting, a request was made that if anyone present was aware of essential patents or patent applications that would apply to C57.131 or to the application guide, they should make it known so it can be reported to IEEE. No one in the room reported knowledge of any essential patents.

Minutes of the previous meeting in Las Vegas were approved as written.

The Working Group is preparing a complete revision of C57.131. Nearly all clauses of the document are candidates for some revision. Ordinarily, a document being circulated for revision is presented with the original text highlighted and the revision shown nearby. In this case we are comparing the IEEE document C57.131 with the corresponding IEC document 60214-1. So excerpts are given of IEEE C57.131-1995, along with the corresponding text of IEC 60214-1.

Because the outline structures of the two documents are different, this initial document is sequenced by subject matter rather than the final sequence of the outline.

The second source of proposals for revision is the C57.131 IEEE reaffirmation ballot, which produced negative votes and affirmative votes with comments that are being addressed. Also, other proposals have surfaced. These proposals are addressed in a second section of the WG survey document.
Approximately 50 pages are devoted to differences between IEEE C57.131-1995 and IEC 60214-1. About 20 pages are devoted to the ballot results of the IEEE reaffirmation ballot. The closing date for this WG ballot (survey) is April 30, 2005. This document can be found on the LTC Working Group Web Page at the Transformers Committee Web site.

While the Working Group has focused attention on revision of C57.131, it also has the assignment to produce an application guide. IEC already has approved an application guide, numbered as 60214-2. So far, this Working Group has not produced a first draft of an application guide. It has worked on the C57.131 revision.

There appear to be two paths we can pursue to produce an application guide. One is to wait until the C57.131 is far enough along that we have time to work on the guide. That is the path that this Working Group has taken. If the Power Transformers Subcommittee feels we need to start on the guide sooner, the Working Group feels we need to establish a Task Force for this application guide. To do that we would need:

1. Find a volunteer to chair the task force.
2. Find volunteer members for this task force.
3. Find a meeting room time slot in the schedule.

The meeting adjourned at about 3:00 pm.

8.9.1.4.1 WORKING GROUP FOR DEVELOPMENT OF PC57.140, GUIDE FOR THE EVALUATION AND RECONDITIONING OF LIQUID IMMERSED POWER TRANSFORMERS - Rowland James, Chairman.

The Working Group met at 3:15 PM on Monday, March 15, 2005 in Jackson, MS. There were 94 in attendance, 39 members and 55 guests.

After introductions of members and guests, Co-chair Rowland James reviewed the Standards Association’s slides pertaining to IEEE’s Patent Requirements for standards under development. Two slides provided by the Transformers Committee were presented on the screen and an opportunity was provided for WG members to identify or disclose patents that may be essential for the use of this standard. No responses were received.

Rowland James also reviewed the IEEE policy on inappropriate discussion topics, such as licensing terms, product pricing, market share and ongoing litigation. The co-chair also instructed the audience to strenuously object, if any inappropriate topics were brought up.

Co-chair W. Bartley reviewed the progress of the Guide. Draft 13 of this Guide was distributed electronically to the WG in December ’04, and comments were received. Those comments were incorporated into Draft 14, which was distributed to the WG in mid-January ’05, along with a Straw Ballot, which was due March 1. Co-Chair W.Bartley announced that even more comments were received and the results of the straw ballot were favorable. Draft 15 was distributed electronically on March 8th. Hard copies of Draft 15a (along with Errata #2) were available at the meeting for all in attendance.

The remainder of the meeting was devoted to changes in Draft 15a. Those topics included:

   Tom Prevost agreed to rewrite this Clause.
2. Clause 5.3 Furan Analysis - A discussion followed on furan analysis. It was a consensus of the group that the limitations of this test were not stressed enough. T.V.Oomen agreed to rewrite this Clause.

3. Clause 6.1.2 Core Reclamping – After considerable discussion it was agreed that both the core-form and shell-form paragraphs needed to be rewritten.

Mike Lau, Rowland James, Steve Antosz and Robert Thompson aged to rewrite this clause.

CoChair Rowland James set a target date of June 1 for distribution of Draft #16.

The meeting adjourned at approximately 4:30pm

8.9.1.5 WEST COAST WORKING GROUP - Michael Lau, Chairman

The West Coast Working Group met Tuesday, March 15th, 2005 with six members present.

The chairman indicated that there is currently no active assignment for this working group. However, prior to this meeting, the working group was asked to handle the reaffirmation of two standards that are due to expire at the end of the year.


Since these two documents are not applicable to only the West Coast users, the purpose and function of the West Coast Working Group was discussed. The original reason for setting up the West Coast Working Group was 1) mainly to reduce the amount of traveling, which is not as significant, and 2) the unique problems, such as seismic activities, has been adequately addressed with the seismic guide.

After the discussion with the Chairman of the Power Transformer Subcommittee, it was agreed that the Working Group be converted to a Task Force to serve as a liaison between this committee and other West Coast Substation Committees.

8.9.1.5.1 WORKING GROUP FOR DEVELOPMENT OF PC57.150, GUIDE FOR THE TRANSPORTATION OF TRANSFORMERS AND REACTORS RATED 10,000 KVA OR LARGER – Tom Lundquist, Chairman


There were 18 members present with 26 guests and 7 requesting membership in the WG. Those requesting membership were:

James Gardner
Jorge Guerra
The IEEE Patent disclosure requirements were discussed and a request was made for disclosure of any patents that may be related to the work of the WG. There were no responses to the request for disclosure.

Approval of minutes from the October meeting was requested. The minutes were approved.

First order of business will be to develop a table of contents (outline) for the new Guide. An initial working outline is as follows:

1. RFQ, Specification
2. Design
3. Shipping preparation (XFMR – Main Tank)
4. Shipping preparation (Accessories)
5. Shipping – General
6. Arrival (Receipt) Inspection

Shipping:

Task force for Truck Rigging & Crane: Craig Swinderman, TF Chair, submitted a significant amount of information for the Heavy Hauling, Transportation and Rigging Guidelines section.

Task force for Rail Shipment: Mike Lau has started work on this section and forwarded information to his task force for review. The next step is to try and get the rail companies involved and to contribute if possible. It is not sure whether they will participate. Les Recksiedler offered to look into writing a portion of this section as they have rail specialists in their company. Tommy Spitzer indicated that there is already a railroad shipping instructions standard by the ARA (American Railroad Association).

Greg will contact Phil Sherman who volunteered as a liaison to this WG with RICA (Railroad Industrial Clearance Association) and SC&RA (Specialized Carriers & Rigging Association) and try and make sure he is at the next meeting.

Task force for specific issues related to Barge and Ship Transport: Philip Sherman and Kipp Yule volunteered at the October meeting as TF co Chairs. Dave Kirshner offered to help with this section as well. They will work on special concerns for barge and ship transportation that can be used by vendors and users to specify risk to equipment reductions. No progress has been made on this section.

Joe Kelly indicated that Juan Thierry may be able to help us with transportation issues for large shell form units.
Forwarder Section: Tom Lundquist, Ewald Schweiger, Kipp Yule, and Dave Kirshner will look at this and work on this section.

Design: Joao Paulo Sousa and Min Jea Lee offered to work on this section.

Shipping Preparation: There may be some overlap from the Installation Guide for this section. Mike Lau indicated that the information that has been prepared for the Installation Guide (C57.93) could be transferred to this guide to avoid this overlap. There would still need to be information in the installation guide that would then direct the user to the Transportation Guide. Peter Balma indicated that he can work on taking the information from the Installation Guide and revising it as appropriate for this guide.

Crating: Much of this has been covered in information provided by Craig Swinderman and can be taken from that section.

Impact Recorders: This maybe a good topic for one of the technical presentation. This topic may also be covered in the Installation Guide. Craig Swinderman and Dave Wallach volunteered to take on this section.

Arrival (Receipt) Inspection: Jane Ann Verner and Jerry Murphy offered to take on this section. They will look at other Guides and Standards that may already cover this and see how much should or shouldn’t be covered in this guide.

Oil Transportation: Tom Lundquist indicated that each state has different requirements, but perhaps some general statements regarding the shipping of oil or transformers shipped with oil. Some of this is also covered in the Installation Guide (C57.93) and the Oil Guide (C57.106). We need to set a demarcation that this guide will cover from the point the transformer leaves the manufacturer or departure site until it hits the pad. The inspection check can be done before the unit is removed from the shipping railcar or trailer and, therefore, should be included. Shipping terminology from the Installation Guide should also be moved into this guide.

Bibliography reference information: Greg requested that the members review their files and references for this section. Suggestion was made to provide a checklist of things to look for and take care of when doing a transformer move.

Meeting was adjourned at 10:45 am.

8.9.1.6 WORKING GROUP FOR THE REVISION OF C57.93, INSTALLATION OF LIQUID-FILLED TRANSFORMERS - Michael Lau, Chairman

The Working Group for The Installation of Liquid-filled Transformers was called to order at 3:15 PM on Tuesday March 15, 2005. There were 41 attendees, 17 members and 23 guests; 1 requested membership. After introductions, the agenda for the meeting was reviewed, and the minutes and the current draft of the guide were distributed. Minutes from the October 26, 2004, meeting in Las Vegas, Nevada, were reviewed and approved.

1) IEEE patent policy was reviewed and the group was asked if there were any disclosures. There were none.

2) All comments received were placed in Draft 6, which is being reviewed today.
3) The first clause discussed was Clause 3 (Internal inspection), which indicates that the breathable dry air to be utilized for inspections should have a dewpoint of -45°C or -49°F. There was considerable discussion of this topic and it was decided that several members of the group would contact their suppliers to see what dew point levels can be supplied. In addition, it was suggested that ASTM D3283 may supply some guidance and could be a reference document for this clause. Moreover, it may be important to consider that ASTM D2029 outlines four methods for determining dewpoint, and should be reviewed for applicability.

4) Next, Clause 4.2 (Shipping), and specifically Clause 4.2.2 (Shipping Terminology), which discuss shipping and shipping terms, were highlighted. The question was raised as to whether to maintain these clauses in the guide or move them to the new Transportation Guide that has been started. After discussion it was decided to leave them in this document and consider their movement to the transportation guide in the next revision cycle.

5) The working group was asked to consider the appropriate processing for a transformer if it was going to be filled with oil for long-term storage, i.e. greater than six months. The consensus of the group was that the processing should be the same as if the transformer was going to be placed in service. Clauses 4.14 (Storage) will be reviewed relative to the consensus reached at this meeting.

6) A discussion of clause 4.2.4 (Truck Shipment) determined that impact recorders could be used for truck shipment when required, but might require different calibration to provide more meaningful results. The general consensus was that an impact recorder is typically placed on a transformer at the factory and would stay in place until the transformer was placed in its final destination. In the transportation process a transformer may see barges, trains, trucks, cranes and rigging, and an impact recorder can provide valuable information in all of these situations. Clauses 4.2.4(Truck Shipment) and 4.2.3.6 (Impact Recorders) will be revised to clarify the intent of this guidance.

7) A review of Clause 4.7.3 (Heat Exchangers and Piping) determined it would be revised to reflect both coolers and radiators, as well as the potential need to pre-flush either with oil prior to assembly to the transformer. Some situations that might warrant this step are contaminated radiators or coolers unsealed in shipment, or those which were never assembled to the transformer in the factory.

8) Clauses 3.9.1(Insulating Liquid) and Clause 4.13.1.1 (Recently Energized Transformers) will be revised to clearly indicate gas-in-oil sampling for the first days and months of operation and, in addition, that this data may be used to calibrate on-line monitoring devices which may also assist in watching recently commissioned units. Twenty-four hour, one week, and first month sampling will be considered.

9) It was presented to the working group that a survey ballot be conducted in the near future. The group agreed, and also indicated that the Power Transformer Sub-committee will also be asked to participate in the survey ballot if agreed to at the subcommittee meeting on March 16, 2005.

10) There was no New or Old Business.
The meeting adjourned at 4:28 PM.

8.9.1.7 TASK FORCE FOR FUNCTIONAL LIFE TESTS OF DE-ENERGIZED TAP CHANGERS – Phil Hopkinson, Chairman

Meeting began at 9:30 AM, Tuesday, March 15, 2005

Approximately 70 people attended the session.

Phil went over the mission. Goal is to be able to finalize a type test on De-energized tap changer that simulates the life of the tap changer. Present testing per IEC is not sufficient to indicate a possible problem over time. There is a need to have a test that simulates Service life. Phil has experience in these areas. Axel (Reinhausen) went over their testing. They have just been reviewing their results. They believe similar data can be gathered at higher currents at lower temperatures. They are concerned about the maximum temperature (130C) that Phil suggests is need for the load cycle testing.

This fall at the T&D Phil is planning a presentation of no-load tap changers in mineral oil and Natural esters. A paper will also be presented with Phil, Axel and possibly Darren Barnett of Central Maloney as possible authors. Phil has never seen contacts that passed the test that failed later in the field. Phil went over the FR3 testing with various contact materials. Test is intended to demonstrate contact stability with de-energized tap changers in FR3. Phil went over the test setup, procedures and recordings for the testing of the de-energized tap changer in FR3. Same type of tap changer was used for all of the testing using the different fluids and contact materials.

All contacts had a copper base with silver and tin plating used in various circumstances. Thermal cycling is an important part of the test. Bulk temperature of around 150C is the goal at the peak load part of the cycling. This is obtained using twice load in a bath of 130C fluid.

Only silver on silver maintained stability in mineral oil. Silver on silver and silver on copper in FR3 was shown in graphs that Phil created. Good trends established. Copper on silver went unstable in mineral oil and Silicone but not in FR3. Graphs showed results for the entire test even including when a heater relay was stuck in position causing high temperature in the initial phase of the test. Conclusion: FR3 caused stability in various contact materials used. FR3 appears to prevent or minimize contact corrosion. Silicone was the most aggressive fluid used.

Theory is that FR3 removes moisture in the area of the contacts. FR3 – lower relative humidity. We don’t know the results yet of tin/copper in FR3. (Future test?) Someone suggested that tin on tin should be tested in FR3 and mineral oil. FR3 is only one of the natural Esters available in the market place. Suggestion was made that other Natural Esters may have the same results. Jerry Corkran made a statement that FR3 absorbs moisture out of the air at a lower rate than mineral oil. Duke was successful in establishing a correlation of gas ratios with a contact problem in tap changers in their power transformers.

A paper needs to be drawn up by a number of authors to justify the type test and provide a reliable source and justification of moving it into the standard. Majority of people present feel it should be in a standard for tap changer tests. Central Maloney (Darren Barnett) has offered to test per Phil’s test involving tin on tin contacts in mineral oil. Phil believes that
contact geometry places a small role with contact pressure and materials used playing a stronger role.

Meeting adjourned at 10:40 AM

8.9.1.7.1 WORKING GROUP FOR REVISION OF C57.135, GUIDE FOR THE APPLICATION, SPECIFICATION AND TESTING OF PHASE-SHIFTING TRANSFORMERS – Tom Lundquist, Chairman

Working Group Meeting Minutes for Dual Logo Phase Shifting Transformer Guide C57.135 - Revision  Jackson MS March 15, 2995 at 11AM. 
Tom Lundquist was acting chair.

• 6 members, 17 guests were in attendance with 7 requests for membership.
• Patent issue was mentioned and no brought forward any items.
• Minutes from the prior meeting were approved.
• Sanjay Patel volunteered to be the vice chairmen of the working group.
• Peter Balma has several suggestions regarding changes in the PST Guide and he will send them to the WG chair Jim McIver.
• Joe Watson has redrawn the figures for section 4 and they will be distributed to the WG members for comment at the next meeting.
• The PST guide is now a dual Logo guide with IEC and revision of the guide will take on a new approach with the PST guide being the first to go through these new processes that will require interface with the IEC.
• A PAR will be generated during the next few weeks by the chair to start the revision process. This will require close work with the SA staff to insure the new dual revision process is attempted.
• It was mentioned that little work was accomplished by the two acting task forces and that this must change to keep the revision process on schedule.
• The meeting was adjourned at 11:50 AM.

8.9.1.7.2 WORKING GROUP FOR REVISION OF C57.12.10, STANDARD REQUIREMENTS FOR LIQUID IMMERSED POWER TRANSFORMERS - Javier Arteaga, Chairman

The WG met on March 15, 2005 from 1:45 PM to 3:00 PM. In attendance were 16 members and 11 guests. Two guests requested membership and were welcomed.

After the introductions were made, the WG chair advised the group members to identify or disclose patents that may be essential for the use of this standard, and no patent was brought to working group’s attention.

Minutes of the previous meeting in the fall of 2004 where approved as written.

Draft 1.0 was reviewed to assess if it is ready for ballot. Several items were identified for modification and draft 2 will be prepared before the end of March and send to the WG members for review. Comments will be expected by the end of May.

The scope of the standard was reviewed at beginning of meeting to keep the WG focused. In the references section of IEC/IEEE combined dictionary to the terminology will be reviewed for possible addition. Tom Lundquist will provide copies of this document.
Forced cooling capacities will be 115% of ONAN capacity for transformer of 2500 KVA and
less, 125% up to 10 MVA, and two cooling stages at 133% and 167% for transformers larger
than 10 MVA. The group decided against standardization at 133% for 10 MVA and below.

This product standard includes one BIL for each nominal system voltage. This will provide
guidance to users on the levels that are considered good practice, and it was noted that
there exist additional levels for each nominal system voltage as indicated in IEEE C57.12.00

A note will be added indicating that the high voltage de-energized taps shall be +/-2 x 2.5%
unless otherwise specified. It was noted that the standard requirements can be override by
user specification.

Required impedance values will be added for higher BILs (>750 kV) following the same
sequence for lower BILs. Additional required values will added for autotransformers base on
their co-ratio and the existing table. If definition of co-ratio is not present on IEEE C57.12.80,
this will be added to document.

New draft will be posted on Transformers Committee website and notification to WG
members for revision will be made using the AMS system.

With no more time for discussions the meeting adjourned.

8.9.2 OLD BUSINESS

None

8.9.3 NEW BUSINESS

C57.116 is up for reaffirmation, Tim Raymond volunteered to oversee this guide through the
process.

The West Coast Working Group was officially dissolved and will now be a Task Force
headed by Mike Lau.

The meeting adjourned at 2:45 pm.

8.10 Underground Transformers and Network Protectors – Carl G. Niemann

Meeting Minutes – Jackson, Mississippi

8.10.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met on Wednesday,
March 16, 2005, in the Amphitheater 2 room of the Hilton Hotel at 9:30 AM with 11 members
and 6 guests present.

8.10.2 Approval of Minutes

The minutes of the October 27, 2004 meeting in Las Vegas, Nevada were approved as
submitted, except with a change of “2500” to “25000”.

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8.10.3 Membership
Membership stands at 16 members. Isran Bamentos was accepted as a member.

8.10.4 Chairman’s Remarks
Administrative Subcommittee Notes Reported to SC
- Our first dual logo IEEE and IEC document, C57.135, is now approved
- Discussed SC14 comments that have been received on several ballots. They will be discussed at higher level.
- Name changes for the .23 & .24 standards may be accomplished by submitting them in the PAR.
- On new PARs for revisions, the committee wants to see the old scope and purpose as well as the original.

8.10.5 Working Group Reports
8.10.5.1 Underground Single Phase Transformers (C57.12.23) – A. Traut, Chairman
1. The WG met on Monday, March 14, 2005, with 13 members and 4 guests present, and 5 guests requesting membership. With the addition of these new members the total membership of the WG now stands at 24.
2. Minutes of the Fall meeting in Las Vegas were approved as submitted.
3. Disclosure of any relevant patents was requested; there were non disclosed
4. The chair reported that a new PAR was completed and approved by NESCOC on 3/4/2005. The expiration date for this PAR is 12/31/2009.
5. There was a discussion of the use of the word enclosure in the document where the intent is to refer to the transformer tank. We agreed that the enclosure refers to the vault or containment means of the transformer and the tank refers to the transformer itself.
6. The WG agreed to make the following changes to Draft 2 of the document.
   A. Change the title of Clause 7.5 from “Enclosure Integrity” to “Tank Integrity” in light of the discussion above. The chair will review other instances of the use of transformer enclosure to insure consistency with item 5 above.
   B. The second paragraph of Clause 2 will be changed so that future revisions of referenced Standards will not be automatically incorporated by reference. That paragraph is borrowed from C57.12.44 and will now read. “When a standard referred to in this document is superseded by a revision, the revision shall not apply. The referenced standard and the specific referenced edition shall be the applicable referenced standard until the new version of the referenced document is incorporated by formal action or appropriate revision of the citing standard.”
   C. Clause 4.2 will be changed to reflect that the terminations of the transformer must also be suitable for submerged operation.
   D. Clause 7.3 will be changed from oil level sight gage to oil level indicator.
   E. Table 1 will be changed to remove the 8.3/14.4 separable connectors as an option for 16340GY, 16340, and 17200. The transformer BIL will remain 95 or 125kV BIL as specified by the user.
7. The meeting was adjourned at 9:15 AM.
8.10.5.2 Three-Phase Underground-Type Transformers (C57.12.24) – Giuseppe Termini, Chairman

1. The WG met on Monday, March 14, 2005, with 11 members and 15 guests present. One guest requested membership

Minutes of the Fall meeting in Las Vegas were approved as submitted.
Disclosure of any relevant patents was requested; there were non disclosed

Old Business:

A. Discussed last meeting activities that included the initiation of the Project Authorization Request (PAR) and the proposed changes to the standard.

New Business:

B. Paul Orehek questioned deviation from original intent of standard. The Chairman stated that the proposed revision to the standard were to address engineering and design changes brought up by members and guests at previous meetings. The revision to the standard will also change the Title, Scope and Purpose as approved at the Las Vegas meeting.

C. The “Draft” PAR was reviewed. The PAR was not submitted pending review by Bill Chiu. According to Carl Niemann the original Title, Scope and Purpose must be included in the PAR before it is submitted.

D. Gerry Paiva of Southern California Edison suggested a survey among utilities be made as to the use of submersible versus occasional submersible. The Chairman stated that the WG has a good representation of utilities that use 3-phase submersible distribution transformers. The pool of utilities in the WG include: Exelon – PECO and ComEd, PSE&G, Georgia Power, Con Ed, PG&E, Delaware Electric, Duke Power and Seattle City Lights.

E. The “Draft” standard revision was reviewed. The word “Type” should be removed from the Title. The word “underground” should be changed to “submersible” in the Scope section.

F. Alan Traut suggested adding the definition of “submersible” into the standard.

G. Stan Kostyal agreed to work on the standard to address the electrical changes.

H. Brian Klaponski agreed to work on the standard to address the mechanical changes.

I. Dan Mulkey suggested to post the “Draft” standard and Minutes on the IEEE Committee website. John Sullivan agreed to take care of the posting.

2. The meeting was adjourned at 9:13 AM.

8.10.5.3 Liquid Filled Secondary Network Transformers (C57.12.40) – B. Klaponski, Chairman

3. The WG met on Monday, March 14, 2005, with 14 members and 3 guests present.

Minutes of the Fall meeting in Las Vegas were approved as submitted.
Disclosure of any relevant patents was requested; there were non disclosed

The chairman noted that the standard had now been balloted. There was a negative ballot from one balloter and some concerns from the Vice Chair of SCC14.
Copies of the affirmative ballots with comments and the negative ballot and the concerns from the Vice Chair of SCC14 were passed out to all the attendees. The rest of the meeting focused on these issues:

A. Bal Gupta’s three comments were accepted as editorial clarifications
B. Ed Bertolini’s (Joe Cultrera’s) comments had been humbly withdrawn
C. Gary Engmann’s general comment was noted for the next revision
D. Saumen Kundu’s comment was noted for the next revision
E. Most of J W Wilson’s comments were noted and will be handled through the final editorial process. His comment about reference specification current dates was not correct and our intent is not to automatically accept the latest reference document.
F. The 4 comments associated with the negative ballot from N. McQuin were rejected by the WG. The Chairman will reply to the negative ballot.
G. The letter from the Vice Chair of SCC14 was reviewed. His first comment on spacing was noted and will be handled in final editing. His other comments were rejected. The WG Chair has replied once to the Vice Chair of SCC14 and will reply again following balloting protocol showing that his comments were given due consideration by the WG.

The WG Chair noted that he will concentrate on getting this standard through the balloting and approval process. He also noted that particularly with the lengthy metric issue with IEEE that this process had taken far too long and this standard is still in error from the NEMA/ANSI publication of 2000. The main issue causing further delay may be SCC14 without involvement of the executive of the Transformers Committee.

It is intended that the next meeting concentrate on the NEXT revision on issues like the coordination of the transformers to the protectors, switch test values, and issues raised by John Rossetti.

4. The meeting was adjourned at 10:30 AM.

8.10.5.4 Secondary Network Protectors (C57.12.44) – D.H. Mulkey, Chairman

5. The WG met on Monday, March 14, 2005, with 9 members and 3 guests present.
6. Minutes of the Fall meeting in Las Vegas were approved as submitted.
7. Disclosure of any relevant patents was requested; there were non disclosed
8. First Ballot closed successfully: 94% Return, 97% Affirmative, 1 Negative ballot
9. Recirculation Ballot closed successfully: 96% Return, 96% Affirmative, 2 Negative ballots
10. Negative Ballots:
    A. Bertolini: restatement of original negative
    B. Wilson: addressed new areas - principally references
11. Draft has been submitted for approval
12. Discussed the negative ballots; Wilson stated the following references should be in the reference section rather than in the annex; the committee determined as follows:
13. Next Steps Once the draft is approved, the Chair will discuss with the assigned editor if moving these references is editorial.
14. The meeting was adjourned at 2:30 PM.

8.10.5.5 Ventilated Dry-Type Network Transformers (C57.12.57) – A.L. Robinson, Chairman
15. The WG was not scheduled to meet.
16. Will work on getting this into the xxx category
17. Chair is unlikely to return

8.10.6 Old Business
18. Name Change to “Submersible and Network Equipment” is proceeding

8.10.7 New Business
19. Brian Klaponski & Carl Nieman– will ask John Rosetti to tour Memphis underground system

8.10.8 Future Meetings
The location and dates for future meetings are as follows:
- Oct 23-27, 2005 Memphis, Tennessee
- March 19-23, 2006 tentatively Miami, Florida
- Oct 22-26, 2006 tentatively, Montreal, Canada
- March 11-15, 2007 no location yet

8.10.9 The Subcommittee adjourned at 10:45 AM.

8.11 Audible Sound and Vibration – J.L. Puri
Audible Sound and Vibrations subcommittee met at 8:00 AM on March 16, 2005 with sixteen members and five guests present.

Chairman’s Report. – Jeewan Puri reported on the pending item dealing with the revision NEMA TR1 Table 2 for standard sound levels for Power Transformers. In the San Diego meeting it was decided that this table should be extended to include additional transformer rating. The present sound levels specified in this table should not be changed.

It was agreed that Jeewan Puri will circulate the extended sound level table among the subcommittee members and obtain comments for discussions in the next meeting. It was agreed that this table will be finally included in the Sound Level Measurement Guide.

WG Report – Jeewan Puri chaired the meeting of the WG for writing Sound Level Measurement Guide. The WG reviewed comments on Draft 3 of the Guide. A total of ten comments were discussed resolved. These comments were mostly editorial. The technical comments added information on Dry Type reactors.

All the comments will be incorporated in Draft 4 of the Guide for circulation among the members of the WG.

New Business
Allen Darwin pointed out that the Sound Level Mitigation Guide will be up for reaffirmation or revision next year. This document could either be reaffirmed or modified to transfer part of this information to the sound level measurement guide. Subcommittee members will be surveyed to obtain input on these issues.

Ramsis Girgis made a brief presentation on the load noise measurement on large power transformers. He pointed out that in low noise level units winding noise could be a significant contributor to the overall noise level of the transformers.

Transformer users must specify total noise level for their transformers and understand that load noise decreases with load on the transformer.

It was agreed that a tutorial on the “Critical issues related to the development of sound level measurement guide” should be presented. This should address the following topics:

- Sound Level Measurement Techniques.
- Sources of Noise in transformers – Load and No Load noise.
- Transmission and Radiation of noise.
- Noise in reactors.
- Any other topics?

Participants of this meeting are requested to provide input regarding the topics that should be included in this tutorial and indicate if they would like to be a presenter in this tutorial.

The meeting adjourned at 9:15 AM

Jeewan Puri

8.12 Bushing Subcommittee – Fred Elliott, Chair

8.12.1 Introduction/Attendance

Fred opened the meeting at 3:00 PM and welcomed the members and guests. There were 47 attendees with 16 members and 31 guests present. 3 guests requested membership to the Bushing Subcommittee.

IEEE patent policy was addressed and no patent conflicts were reported.

8.12.2 Approval of Minutes of Last Meeting

The minutes were approved as written.

8.12.3 Chairman’s Remarks

Fred made the following remarks after attending the Administrative Subcommittee.
The Fall 2005 Transformer Committee meeting will be in Memphis, Tennessee, October 23-27, hosted by Randy Williams and ABB Inc. Technical tours (ABB, MR and ERMCO) will be scheduled.

AM system will be used for future administration/registration process. Members are encouraged to use the system and pre-registration before the mtg was strongly recommended to avoid high costs resulted from late registrations.

For effective communications, the members can have their documents posted on the web, please notice that 500 kB will be the limit of file size.

Transformer committee meeting format will stay at 3.5 days. Thursday meeting will be more efficient and all the reports should be short and to the point.

8.12.4 Working Group (WG) and Task Force (TF) Reports

8.12.4.1 WG - Revision of C57.19.00 - Keith Ellis, Chair

Keith reported that;

- The final document is under editorial review process, and will be ready end of the year.
- At the same time, a request has been submitted to extend the PAR.

8.12.4.2 TF - Revision of C57.19.100 – Tommy Spitzer, Chair

The chair called the mtg to order at 11:00 am, March 15 with 19 members and 31 guests, 3 of whom requested for membership. The members and guests were introduced.

The patent information was shown and discussed. No patents were disclosed.

The minutes of the Las Vegas meeting were then approved.

The application of outdoor bushings to indoors was discussed. Wording will be added to clarify some of the definitions. We will add a section to explain alternative materials that may improve performance in some instances.

Bushing storage was reviewed and discussed. This section will be revised to clarify the PCB information. The structure of this section will also be revised.

Bushing monitoring was discussed. Wording of this section will be revised to conform to industry standards.

The timing of this standard was discussed. The meeting was polled and it was felt that the standard needs to be revised. The bushing subcommittee was approached on this and a PAR will be initiated.

The discussion on draw lead extension was made. This section will be set up in two parts, one for extensions from manufacturers for use with their bushings and the another for users to help them adapt older bushings.

The meeting was adjourned at 12:00 noon.
8.12.4.3  TF – Bulk Bushings – Bob Hartgrove, Chair

No meeting / report.

8.12.4.4  C57.19.03 – DC busing Standard

Fred Elliott reported during SC meeting that;
•  An initial draft of the corrigendum has been circulated to the members of the TF for comments, and being reviewed.
•  A revised draft will be sent out soon for balloting with the new system.

8.12.4.5  IEC Bushing Standards Activity - John Graham of Trench Ltd., UK

As per reported, there has been a little progress with the revision of IEC60137. A Committee Draft was issued last year and the comments received were discussed at a meeting held at NEMA headquarters in December 2004. Some items have been referred back to the Maintenance Team for further discussion. The plan is for a further (Final) Committee Draft by June 2005.

8.12.5  Old Business

•  C57.19.01 will be due for action end of the year (reaffirmation, revision or withdrawal). A survey for action options was sent to the members (32) and 19 responses were received: 16 for reaffirmation and the balance for revision. Based on the results, the reaffirmation was suggested and a PAR will be requested.
•  TF - Bulk Bushings: Fred expressed that TF was pre-maturely dismantled since high current bushings for GSU application still needed to be addressed. A session will be scheduled in Memphis mtg.

8.12.6  New Business

No topic was suggested for new business

8.12.7  Technical Papers

No activity was reported for this mtg.

8.12.8  Adjournment

The meeting was adjourned at 3:30 PM.

Minutes submitted respectively by,

Peter D. Zhao
Secretary
Bushing Subcommittee
9.0 Editor’s Report – Spring 2005 Jackson, MS Meeting

Between October 21, 2004 and March 10, 2005 a total of 38 papers in the transformer area were submitted to IEEE Transactions on Power Delivery for possible publication. During this time 23 reviews were completed and 15 reviews are still in-progress. For completed reviews, the recommendations were: Accept without changes – 10; Revise and Resubmit – 8; and Reject - 5. A complete summary of these papers is listed herein.

Many of the papers in this rotation have been revised and resubmitted at least once.

I would like to thank all of the reviewers who volunteered for this effort and donated their time, and would like to encourage everyone associated with IEEE Transformers Committee activities to consider becoming a Reviewer.

There are several papers that are related to transformer condition assessment methodologies. In particular these papers deal with insulation and oil analysis, moisture determination, DGA, fluids, ageing, etc. There seems to be a lack of available experts in these areas willing to review these papers. If you have the necessary background or know of someone who does, please advise me.

Respectfully Submitted,
Stephen Antosz
Editor, IEEE Transactions on Power Delivery
santosz@ieee.org

All members of the IEEE Transformer Committee are invited to review technical papers. Please sign up at: http://tpwrd-ieee.manuscriptcentral.com/

INSTRUCTIONS FOR SIGNING UP TO REVIEW IEEE TRANSACTIONS PAPERS

1. Before you create a new account, please check for an existing account by clicking on: "Check for Existing Account"
2. Assuming that you do not get an existing account notification email, click on "Create New Account" and enter in your information.
3. Please specify any “Specialty / Area of Expertise” according to the 5 numerical codes below:

   13a: Power and Instrument Transformers  
   13b: Insulating fluids category  
   13c: Dielectric Testing  
   13d: Audible Noise and Vibration  
   13e: Transformer Modeling Techniques

4. Please specify any “Key Words” such as: distribution transformers, core losses, oil DGA, or thermal, for example.
5. Submit your information.
6. Click on "Request Reviewer Status" to be enabled as a reviewer.
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<td>frequency, vibration</td>
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10.0 Meetings Planning Subcommittee

10.0 Meetings Planning Subcommittee - G. W. Anderson, SC Chair

The Meetings Planning Subcommittee (Mtgs SC) holds an open meeting at each Committee meeting to plan future meetings and to assist future hosts by education, mixing of ideas, and lessons-learned. The meeting is attended by the SC Chair, the present meeting host, future hosts, and hosts from past meetings. Others interested in hosting a future meeting, or assisting with meeting planning, are encouraged to attend.

The SC meeting began at 3:00 p.m., Wednesday, March 16, 2005 at the Hilton Hotel, in Jackson, Mississippi, USA. Seventeen (17) people were in attendance. Greg Anderson, SC Chair facilitated. The meeting began with introductions by the attendees.

10.1 Committee Finances

Committee funds are presently $3,002.58 (as of February 1, 2005). Greg thanked the Meeting Hosts for working hard to control expenses and help with stewardship of the Committee’s funds.

10.2 Past & Present Meetings

10.2.1 Past Meeting - Las Vegas, California, USA (October 24-28, 2004)

Special thanks to Don and Wilma Cash for being the gracious host and hostess of the Las Vegas Meeting. It was noted that Don and Wilma hosted a meeting in Detroit in 1983. We hope they will accept the call to host another meeting 20 years from now! Attendance was exceptional with 352 attendees and 92 companions (FYI, the Fall 2000 Meeting in Niagara Falls was 361 attendees and 94 companions).

The Green Valley Ranch Resort was a great location for a meeting. It was nice that they were able to separate the casino from the meeting area and there was little necessity to walk through the casino to get to guest rooms and the meeting area.

10.2.2 Present Meeting - Jackson, Mississippi, USA (March 13-17, 2005)

Andy Speegle and Kuhlman Electric were the hosts of this meeting. Jackson, Mississippi was chosen due to its central location of 3-4 transformer-related manufacturing facilities including Kuhlman Electric, Howard Industries, and Siemens.

We had four technical tours at this meeting! On Sunday morning, one bus-load of attendees visited the Kuhlman transformer factory in Crystal Springs, MS. On Monday evening, one bus-load of attendees visited the Siemens regulator and breaker factory in Jackson. On Tuesday evening, 55 people visited the new Nissan auto assembly plant in Canton, MS. Finally, on Thursday evening, two bus-loads of people visited both the distribution transformer and medium facilities of Howard Industries and had dinner at Billy Howard’s home.

The speaker for the Tuesday Luncheon (154 attendees) was Mr. Hank Flick, PhD and Director of Communication Department at Mississippi State University. Mr. Flick gave us an “interesting reflection” of Southern Culture. On Monday, 82 people participated in a working
luncheon where Bill Chiu, our Standards Coordinator reviewed the procedures in developing standards. Jodi Haasz with IEEE Standards assisted Bill and made a presentation. This event continues to be very well accepted.

On Wednesday evening, 150 people had dinner at the Old Capital Inn in Jackson. On Monday, 19 companions/spouses enjoyed a bus tour of historic Vicksburg, MS. On Tuesday, 17 companions/spouses enjoyed a day at Mynelle Gardens and the Craftsmen’s Guild of Mississippi, and lunch at the University Club.

Special thanks to Pauwels, Serveron, Weidmann-ACTI, and VA TECH for sponsoring coffee breaks at this meeting and helping us defray the cost.

10.3 Future Meetings

10.3.1 Summary

The following dates, locations and respective hosts for future meetings were reviewed.

- October 23-27, 2005 -- Memphis Tennessee at the Peabody Hotel. Hosted by Randy Williams and ABB Inc.
- March 19-23, 2006 -- Although as search for a meeting location in Miami was investigated, a meeting is now planned these dates in Costa Mesa, California (near LA).
- October 22-26, 2006 -- Montreal, Quebec hosted by Thang Hochanh and Hydro-Quebec.
- March 11-15, 2007 (tentative date) -- location to be determined

Possible locations for future meetings include: Minneapolis (possibly Fall 2007), Miami, Denver, Phoenix, Kansas City, New York or New Jersey (near IEEE HQ) to name a few. Discussions continue of a possible meeting in an overseas location such as Portugal, (possibly Fall 2008), or perhaps Italy, Japan or Korea.

10.3.2 Upcoming Fall 2005 Meeting (October 23-27) -- Memphis, Tennessee

Randy Williams and ABB Inc. will be the host of this meeting. A tour of ABB’s Alamo Facility is planned. Tours of ERMCO and Reinhausen facilities are also possible. We will have exclusive use of Graceland for the Wednesday Evening Dinner Social.

10.3.3 Upcoming Spring 2006 Meeting (March 19-23) -- location to be determined

At the time of the Jackson Meeting, no location had been confirmed for this meeting.

10.4 Working Group Report

10.4.1 WG on Web-Site Development

This working group did not meet in Vegas.

10.5 New Business

10.5.1 Association Management System
We are now using a new system is revolutionizing how we communicate within the Committee, and administrate our membership and meeting attendance records. This new system has replaced our old Reflector/Listserv email system and is now the Committee's primary mode of communication.

The Committee has contracted with a company called 123Signup which provides membership administration and event registration solutions. We have modified their core system into a system we call the "Association Management System" (or AM System or simply AMS). This innovative web-based system allows our 80+ subcommittees, working groups, task forces, and liaison associations to communicate more effectively via email messages. Fewer bounced emails will result because individual contact information is "self-maintained" and is stored in a single relational database used by all functions of the system. Activity leaders can print meeting rosters and maintain meeting attendance records. The new AM System did a great job with assisting with the registration of the Jackson meeting, providing a more efficient and cost-effective on-line meeting registration system. We are continuing to improve the reporting capability of the system.

There are essentially three levels of membership in the system:

- Committee Member (a "full voting member" of the Committees, including Emeritus Member, IEEE Life Member, and Corresponding Member)
- Active Participant (not a Committee Member, but an active contributor and meeting attendee)
- Interested Individual (a "remote observer" and supporter of the Committee's scope)

Anyone can enroll in the AM System -- even those who desire to passively monitor our work from a distance. Initially, a person is automatically enrolled as an Interested Individual. Once Committee membership or regular participation is validated, enrollment is upgraded to Committee Member or Active Participant.

More information can be found on the AM System page within our website.

10.5.2 Tutorials/Presentations

The technical tutorials/presentations continue to "exceed all expectations". Material from each of the presentations is available on the Committee's web-site. Contact Kent Haggerty (n.kent.haggerty@ieee.org) if you are interested in presenting in the future or have an idea of a future presentation.

Two presentations on "Internet Meetings" were held on Monday and Tuesday evening. The presentations were facilitated by Craig Stiegemeier and attended remotely by individuals from Microsoft. Over 40 individuals joined the mock on-line meeting using the wireless Internet connection provided in the meeting area. The most interesting thing was that almost a dozen individuals, who could not attend the Jackson meeting, joined the presentation remotely from home!

We discontinued providing CEUs at the presentations. It was determined that most people do not need accredited CEUs for maintaining professional licenses, but rather unaccredited professional development hours (PDHs) is sufficient. Again at this meeting, we provided a means for attendees to download a “certificate of attendance” from the web-site and bring to the presentation for the instructor to personally sign. This process worked well in previous meetings and will continue for future meetings.

We continue to experiment with recording the presentations with a program called "Camedia". This application runs in the background of a MS-Powerpoint presentation, creating a .MOV file, while recording in real-time the voice of the presentation over the slide presentation. We will continue to experiment with this program and provide the presentations on the website after each meeting.

10.5.3 Coffee Break Sponsors

We continue to develop a program to allow companies to sponsor coffee breaks. Joe Watson is administrating the program. We highlight the sponsors in the Meeting Schedule and indicate their patronage on new signs located in the break area. Representative from the companies are allowed to distribute limited commercial information (flyers) during the break. We will continue to cautiously experiment with this and develop a policy to foster relationships with vendors and help maintain our low registration fees, while keeping a technical focus. We have also started posting the list of upcoming prospective break sponsors on the website. Contact Joe (joe_watson@ieee.org) if you are interested in sponsoring a future break.

10.5.4 Committee Historians

We continue to look for volunteers to help document and archive the history of the Committee; i.e. old meeting minutes, old photos, etc. It was proposed that a group of "historians" (or "old timers") develop a plan to gather old meeting information for permanent archiving. It was suggested that we should create an "anniversary CD" that will contain an assembly of documents and meeting minutes from the past 10-15 years. The CD could perhaps be presented as a gift to all Committee Members and made available to meeting guests and other interested individuals. We continue to look for someone to champion this effort.

10.6 Miscellaneous

Additional topics were discussed and reviewed:

We have purchased wireless LAN equipment that we will bring to each meeting. This will provide attendees with a secure access to the Internet. An access key to the network can be obtained at the meeting registration desk. For more information, contact Craig Stiegemeier (craig.stiegemeier@ieee.org).

We started taking a photo of each attendee at the San Diego Meeting and created a webpage displaying the photos. This would help everyone "place a face with a name". The page would be protected from access from the general public and will be accessible only behind the secure portion of the website. We initially are only including photos of Committee
members on the website. These photos will soon be incorporated into the AM System in the member profiles.

Again it was noted that the Committee’s "Marketing Flyer" is available on the website (see the "Services" box on the homepage). It is encouraged that everyone download and print this two-page document and distribute it at local conferences, seminars, and IEEE meetings.

The meeting was adjourned.

Respectfully Submitted,
Greg Anderson, SC Chair

11.0 Reports of Liaison Representatives

11.1 Standard Coordinating Committee No. 4 – P.A. Payne

No update was given by Ms Payne for this meeting

11.2 IEC TC-14 Technical Advisor to USNC – P.J. Hopkinson

U.S. National Committee of the International Electrotechnical Commission,
A Committee of the American National Standards Institute
Technical Advisory Group for IEC TC 14

TAG Administrator:
National Electrical Manufacturers Association
1300 North 17th Street, Suite 1847, Rosslyn, VA 22209
Tel: 703-841-3252, fax: 703-841-3353

AGENDA

PLACE OF MEETING: Hilton Jackson
1001 East County Line Road
Jackson, MS 39211

DATE AND TIME: Wednesday, March 16, 2005
3:00 – 4:15 PM

PRESIDING OFFICER: P. Hopkinison, Technical Advisor

1. CALL TO ORDER

2. APPROVAL OF THE AGENDA

4. APPROVAL OF THE PREVIOUS MINUTES
Minutes of the meeting held October 27, 2004 are submitted for approval.

5. REVIEW AND UPDATE OF USNC ROSTERS FOR TC 14

Members to review the TAG roster and make any corrections or changes as needed.

6. PREPARATION FOR PLENARY MEETING TO BE HELD IN CAPE TOWN, SOUTH AFRICA, OCTOBER 2005

7. OPEN DOCUMENTS

7.1 14/497/CDV - Power transformers – Part 13: Self-protected liquid filled transformers

   This document was previously circulated as a CD last summer. There was an issue with clause 12.4.1.4 in the CD.

   Action Item: Contact Mr. David Aho of Cooper Power or Mr. Gerry Hodge of Howard Industries for reviewing this document.

8. OTHER DOCUMENTS

8.1 14/485A/CDV - IEC 60076-7 Ed. 1: Power transformers - Part 7: Loading guide for oil-immersed power transformers

   This document was approved, and the US recommended approval.

8.2 14/487/CDV - Convertor transformers - Part 3: Application guide (61378-3 Ed. 1)

   This document was approved, and the US recommended approval.

8.3 14/489/CDV - IEC 60076-5: Power transformers - Part 5: Ability to withstand short circuit

   This document was approved, and the US recommended approval.

8.4 14/490/FDIS - IEC 60214-2 Ed.1: Tap changers - Part 2: Application guide

   This document was approved, and the US recommended approval. Our desire is to add the de-energized tap changer contact functional life test in this document and offer it for dual logo publication.

This document was approved, and the US recommended approval.

8. SUGGESTED REVISION TO IEC 60076-1

Mr. Provost’s suggested revision to IEC 60076-1 to be sent USNC with the recommendation that it be submitted to the Secretary of TC14 as a formal US proposal. This action requires approval of the TAG.

The TAG membership recommends that the presently specified 75 °C reference temperature in this document should be modified to use winding rise plus 20 °C for reference temperature.

9. CONSIDERATION FOR APPOINTING A NEW TECHNICAL ADVISOR: TAG members were encouraged to volunteer for the position of Vice Chair of The US TAG for participating in future meetings.

10. OTHER BUSINESS

- IEC 60076-15 Gas-filled type Power Transformers: Mr. Jin Sim agreed to review the document and provide recommendations for further action by the TAG on this document.

11. DATE AND PLACE OF THE NEXT MEETING: Memphis, TN on October 26, 2005

12. ADJOURN

11.3 CIGRE liaison report - JC Riboud

Study Committee A2 Transformers

Last SC committee meeting during Paris session in August 2004 have seen some organisational changes

The new chairman is Mr Pierre Boss (CH) and the new secretary is Mr Claude Rajotte (Ca)

The SC A2 has 4 advisory groups:
- Transformer technology leaded by H Reijnders  h.f.reijnders@smit-trafo.nl
- Transformer users leaded by C Rajotte rajotte.claude@hydro.qc.ca
- Transversal cigré activity leaded by P Lorin pierre.lorin@ch.abb.com
- Strategic planning leaded by P Boss pierre.boss@ch.abb.com
Advisory group shall assess the need for further work, suggest preferential subjects, and report to the sc.

Recent publication:
The WG A2 20 on economics of transformer management published a brochure under number 248. A summary of which can be read in Electra number 214 from June 2004. This will also be available on cdrom.

Ongoing Work:
- Liaison with D1 01 oil impregnated paper
  D1 01 leaded by Lars Lundgaard lars.lundgaard@sintef.no deals with paper fluid impregnated systems. Liaisons have been created with TF 13 on oil maintenance: N Dominelli from BC Hydro and with TF 12 on furanes: L Cheim cheim@siemens.com

- JWG A2/ A3 B3/ 21 Electrical environment
  Conclusion is that even if there is not enough statistical datas to point out specific failure due to fast transient a case by case study have allowed to develop some mitigation guidance. Group under the leadership of M Glinkowski mietek.glinkowski@us.abb.com

- A2 23 Life time data management
  Report will be finalised during early 2005. This group is leaded by N Fantana
  nicolaie.fantana@de.abb.com

- A2 24 thermal performances:
  This group is leaded by J Declercq jan.declercq@pauwels.com it is dealing with the fundamentals of ageing, experience with high temperature insulation, modelling of winding temperature and testing

- A2 25 bushing reliability
  A survey has been sent a few failure have been reported by utilities and will be compiled.

- A2 26 Mechanical condition assessment
  Lead by P Picher patrick.picher@hydro.qc.ca. This group will deal with FRA practices and results interpretation.

- A2 27 recommendation for condition monitoring facilities
  Lead by P Jarman Paul.Jarman@ngtuk.com the goal is to standardise interface between transformer and monitoring sensors. This includes valves, dielectric windows and so on.

- JWG A2 B4 28 HVDC transformers
  Lead by M Saravolac milan.saravolac@areva-td.com task is to analyse current performances of HVDC transformers and make recommendation addressing those issues through design review.

- A2- 30 Moisture:
  Viktor Sokolov sokolov@ztz-service.com.ua has prepared a draft brochure which is currently under review by Jacques Aubin, Paul Griffin and John Lapworth
  JLapworth@doble.com
• A2- 29 reliability
  This new task force leaded by K Ryen kryen@broadpark.no has for goal to set up a reliability survey.

Next colloquium

The next A2 committee colloquium will be in Moscow from June the 20th to June the 23rd. It will have:
  2 days for presentation
  ½ day for tutorials
  ½ day for WG meeting

The preferential subjects are:
  PS1 : Transformer reliability on technical , economical and strategic aspect.
  PS2 : Effect of transients on transformers performances

All invitation package is available on the cigre A2 committee web site. Attendance is not limited as previously.

Next Session Paris 2006

The preferential subjects are:
  PS1 : Transformer reliability on technical , economical and strategic aspect.
  PS2 : Phase shifter application and specification
  PS3 : Effect of transients on transformers performances

For communication you should apply through your national committee.

You can find more on www.cigre-scA2.org

12.0 Old Business – K.S. Hanus

There were no items of old business raised for discussion.

13.0 New Business – K.S. Hanus

There were no items of new business raised.

Respectfully submitted,

Thomas A. Prevost
Secretary
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<td>Wilks A. L. (731) 285-9121 <a href="mailto:awilks@ermco-ecl.com">awilks@ermco-ecl.com</a></td>
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<td>IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment</td>
<td>Jakob F.</td>
<td>1/30/2000</td>
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<td>(916) 455-2284</td>
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<td>frank/kg@ieee.org</td>
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<td>C57.111</td>
<td>IEEE Guide for Acceptance of Less-Flammable Hydrocarbon Fluid in Transformers</td>
<td>McShane C. P.</td>
<td>1/30/2000</td>
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<td>C57.121</td>
<td>IEEE Guide for the Reclamation of Insulating Oil and Criteria for Its Use</td>
<td>Pearce H. A.</td>
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<td>Guide for the Definition of Thermal Duplicate Liquid-Immersed</td>
<td>Beaster, B. L.</td>
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<td>Distribution, Power, and Regulating Transformers</td>
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<td>C57.119</td>
<td>IEEE Recommended Practice for Performing Temperature Rise Tests on Oil</td>
<td>Tuli, S. C.</td>
<td>2001</td>
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<td>Immersed Power Transformers at Loads Beyond Nameplate Ratings</td>
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<td>Materials in Liquid-Immersed Power Transformers</td>
<td>(820) 751-3539</td>
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<td>PC57.140</td>
<td>Evaluation and Reconditioning of Liquid Immersed Power Transformers</td>
<td>James R.L. (504) 576-6246 <a href="mailto:r.james@ieee.org">r.james@ieee.org</a></td>
<td>9/16/1999</td>
<td>12/31/2005</td>
<td>D14 currently in pre-ballot editorial review - submitted 2/7/05</td>
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<td>PC57.143</td>
<td>Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components</td>
<td>Lux A. (919) 931-2494 <a href="mailto:alux@KEMA.us">alux@KEMA.us</a></td>
<td>3/21/2002</td>
<td>12/31/2007</td>
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<td>PC57.148</td>
<td>Standard for Control Cabinets for Power Transformers</td>
<td>Watson J.D. (501) 691-2266 <a href="mailto:joe.watson@ieee.org">joe.watson@ieee.org</a></td>
<td>2/27/2004</td>
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<td>C57.120</td>
<td>IEEE Loss Evaluation Guide for Power Transformers and Reactors</td>
<td></td>
<td>1991</td>
<td>12/31/2005</td>
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<td>Working Group Chair/Technical Contact: Roger G. Jacobsen not in participant roster 206-822-7628 Ref Std. 842</td>
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<td>C57.125</td>
<td>IEEE Guide for Failure Investigation, Documentation, and Analysis for Power Transformers and Shunt Reactors</td>
<td>Binder, Jr. W. B. (724) 654-3839 <a href="mailto:wgbinder@aol.com">wgbinder@aol.com</a></td>
<td>1991</td>
<td>3/31/2005</td>
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<td>C57.131</td>
<td>IEEE Standard Requirements for Load Tap Changers</td>
<td>Trumb T. P. (312) 266-7647 <a href="mailto:t.ptruh@ix.netcom.com">t.ptruh@ix.netcom.com</a></td>
<td>1995</td>
<td>5/15/2003</td>
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<td>SubCommittee Chair</td>
<td>POWER TRANSFORMERS</td>
<td>Lundquist T.</td>
<td>(602) 234-8617</td>
<td>6/13/2002</td>
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<td>STANDARDS</td>
<td>Chiu B. W.</td>
<td>(626) 308-6086 <a href="mailto:bill.chiu@ieee.org">bill.chiu@ieee.org</a></td>
<td>6/14/2001</td>
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<td>C57.12.00</td>
<td>IEEE Standard General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers</td>
<td>Tuli S. C.</td>
<td>(262) 547-0123 x1428 <a href="mailto:subhash.tuli@waukeshaelectric.spx.com">subhash.tuli@waukeshaelectric.spx.com</a></td>
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<td>C57.12.70</td>
<td>IEEE Standard Terminal Markings and Connections for Distribution and Power Transformers</td>
<td>Trush T. P.</td>
<td>(312) 266-7647 <a href="mailto:tptrush@ix.netcom.com">tptrush@ix.netcom.com</a></td>
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<td>Guide for Metric Conversion of Transformer Standards</td>
<td>Olson T.</td>
<td>(204) 474-4080 <a href="mailto:tolson@hydro.mb.ca">tolson@hydro.mb.ca</a></td>
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Prepared by B. Chiu
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<td>Niemann C. G.</td>
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<td>Trust A.</td>
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