

IEEE/PES
Transformers
Committee

Meeting Minutes
April 18, 2002

***IEEE/PES TRANSFORMERS COMMITTEE
MEETING***

April 18, 2002

Vancouver, British Columbia, Canada

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April 14-18, 2002

ATTENDANCE SUMMARY

MEMBERS ATTENDING, AND PRESENT FOR MAIN MEETING (4/18)

Aho, David	Fyvie, Jim	MacMillan, Donald	Riffon, Pierre
Allan, Dennis	Ghafourian, Ali	Marek, Rick	Romano, Ken
Anderson, Greg	Girgis, Ramsis	Matthews, John	Rossetti, John
Arteaga, Javier	Graham, Richard	McClure, Phil	Schweiger, Ewald
Ayers, Don	Griesacker, Bill	McNelly, Susan	Shull, Stephen
Barnard, Dave	Grunert, Bob	McQuin, Nigel	Sim, Jin
Bartley, Bill	Haas, Michael	McTaggart, Ross	Singh, Prit
Blackburn III, Gene	Hager, Jr., Red	Miller, Kent	Smith, Jim
Boettger, Bill	Haggerty, N. Kent	Mitelman, Mike	Smith, Ed
Borst, John	Hanus, Ken	Molden, Arthur	Stahara, Ron
Chiu, Bill	Harlow, Jim	Niemann, Carl	Stiegemeier, Craig
Colopy, Craig	Hayes, Roger	Papp, Klaus	Thompson, James
Corkran, Jerry	Highton, Keith R.	Patel, Bipin	Tuli, Subhash
Crouse, John	Hopkinson, Phil	Patton, Jesse	Veitch, Bob
Dohnal, Dieter	James, Rowland	Payne, Paulette	Wagenaar, Loren
Duckett, Don	Johnson, Jr., Chuck	Pekarek, Tom	Ward, Barry
Dudley, Richard	Kelly, Joe	Plaster, Leon	Watson, Joe
Elliott, Fred	Kennedy, Sheldon	Platts, Don	Wilks, Alan
Ellis, Keith	Kim, Dong	Preininger, Gustav	Zhao, Peter
Fallon, Don	Lau, Mike	Prevost, Tom	
Foldi, Joe	Lowe, Don	Puri, Jeewan	

MEMBERS ATTENDING, BUT NOT PRESENT FOR MAIN MEETING (4/18)

Antosz, Stephen	Galloway, Dudley	Kline, Don	Pierce, Lin
Balma, Peter	Harley, Jack	Ladroga, Rick	Ruevekamp, Henk
Chu, Don	Hartgrove, Bob	Lindgren, Stan	Snyder, Steven
Degeneff, Bob	Jhonsa, VJ	Ma, Joe	Stensland, Len
Dix, Larry	Jonnatti, Tony	Perkins, Mark	

MEMBERS ABSENT

Allustiarti, Raymond	Barnes, Mike	Clark, Tom	Foster, Sam
Altman, Mike	Bertolini, Edward	Compton, Olin	Franchek, Mike
Andersen, Glenn	Binder, Jr., Wally	Dahinden, Vincenz	Frank, P.E., Jerry
Arnold, Jr., Jim	Bonucchi, Joe	Diamantis, Tom	Gaytan, Carlos
Atout, Khaled	Brown, Charles	Easley, John	Gillies, Jim
Aubin, Jacques	Cambre, Jr., Max	Ebert, John	Grubb, Bob
Bancroft, Roy	Carter, Bill	Feghali, Pierre	Gryszkiewicz, Frank
Barker, Ron	Cash, Don	Fleeman, Jeff	Hall, Geoff

Hanique, Ernst	Long, Leonard	Patterson, Jr., Wes	Smith, Ray
Hansen, Wayne	Loveless, Mark	Pearce, Henry	Smith, Jerry
Heinrichs, Frank	Lowdermilk, Larry	Perco, Dan	Stein, Werner
Henning, Bill	Lowe, Richard	Poulin, Bertrand	Stewart, Peter
Hoefler, Pete	Lundquist, Tom	Progar, John	Stoner, Ron
Huddleston III, Jim	Maguire, William	Purohit, Dilip	Sullivan, John
Iman, Mike	Marlow, Dennis	Raymond, Charlie	Templeton, Jim
Johnson, David	Massouda, Tito	Risse, Peter	Thomas, Ray
Juhlin, Lars-Erik	McGill, Jack	Robbins, Chris	Traub, Tom
Kallaur, Gene	McShane, Patrick	Robinson, Butch	Trummer, Edgar
Kappeler, Cal	Mehta, Sam	Sampat, Mahesh	Vaillancourt, Georges
Kennedy, Bill	Moore, Harold	Sankar, V.S.N.	Weffer, Felipe
Khalin, Vladimir	Morehart, Gene	Savio, Leo	Whearty, Bob
Koenig, E.	Murray, Chuck	Scheu, Bob	Wimmer, Bill
Lackey, John	Musil, R.J.	Sharma, Devki	Woodcock, David
Lazar, John	Mutschler, Jr., Bill	Shenoy, Vic	Zhao, Tony
Lewis, Tim	Nicholas, Ray	Shertukde, Hemchandra	
Lewis, Frank	Norton, Ed	Shteyh, Ibrahim	
Light, Hal	Paiva, Gerry	Smith, Steve	

GUESTS ATTENDING, AND PRESENT FOR MAIN MEETING (4/18)

Ares, Ignacio	Fernihough, William	Klaponski, Brian	Rose, Don
Baranowski, Derek	Ferreira, Marcos	Kranich, Neil	Schappell, Steven
Beauchemin, Claude	Forrest, Alan	Leuenberger, Boyd	Shaver, Lenny
Beckman, Stephen	Forsyth, Bruce	Lu, Franklin	Simpson, Jr., Bill
Bello, Oscar	Foster, Derek	Martinez, Al	Spitzer, Tommy
Britton, Jeffrey	Galbraith, Shawn	Munro, Andy	Steineman, Andy
Buchanan, Paul	Garcia, Eduardo	Nelson, Tom	Subramanian, Raman
Bush, Carl	Garnitschnig, Andreas	Newman, Kevin	Sweetser, Charles
Callsen, Thomas	Gauthier, John	Ngnegueu, Triomphant	Swinderman, Craig
Carlos, Arnaldo	Gianakouros, Harry	Nielsen, Jim	Taylor, Robyn
Castellanos, Juan	Gruber, Myron	Nols, Ernest	TeNyenhuis, Ed
Christini, Mark	Harbaugh, Tom	Nordman, Hasse	Termine, Giuseppe
Coe, Paul	Heinzig, Peter	Olan, Dave	Thompson, Robert
Coffeen, Larry	Henry III, George	Olen, Robert	Toda, Katsutoshi
Cooper, Tommy	Hochanh, Thang	Olson, Tim	Trivitt, Donnie
Darovny, Bill	Holland, John	Oommen, T.V.	Tuohy, John
Darwin, Alan	Humenick, Noelle	Oriti, Samuel	Verdolin, Roger
Davis, Larry	Jaroszewski, Marion	Pages, Remi	Walls, Albert
Davis, Eric	Jostrand, Patrick	Pillitteri, Paul	Zarmandily, Hassan
Eckholz, Klaus	Kalra, C.J.	Raymond, Tim	
El Hayek, Joseph	Kennedy, Gael	Riboud, Jean-Christophe	
Fausch, Reto	Kirker, Ron	Rivers, Mark	

GUESTS ATTENDING, BUT NOT PRESENT FOR MAIN MEETING (4/18)

Anderson, Thomas	Basu, Bikash	Bode, Tim	Cross, Shawn
Areteanu, Viorika	Benach, Jeffrey	Braun, Jean-Marie	Cuk, Nick
Banjoya, Nagatoshi	Betancourt, Enrique	Brender, David	Culhane, Michael
Barnett, Darren	Bier, Bruce	Brush, Edwin	D'Amico, Frank
Bartek, Al	Blake, Dennis	Caruso, Charles	deCourcelle, Terry

Faulkner, Mark	Jauch, Tom	Nordman, Russ	Shekelton, Jay
Fischer, Paul	Juj, Hardev	Orehek, Paul	Shor, Andre
Forrest, George	Kennedy, Karen	Owen, Edwin	So, Eddy
Gardner, James	Kostyal, Stanley	Patel, Sanjay	Spoorenberg, Kees
Gin, Bill	Kurth, Bernhard	Peterson, Alan	Stenestam, Bengt-Olof
Gomez Ibarra, Rolando	Lam, Alex	Pitts, Wendell	Still, Robert
Graham, John	Luby, Thomas	Pregent, Guy	Swift, Glenn
Graifer, Alexander	Matthews, Lee	Rahmatian, Farnoosh	Teetsel, Mark
Guardado, Jeremy	McCrae, George	Rave, Martin	Vandermaar, John
Hanson, Dave	Melanson, Joseph	Ray, Jeffrey	Von Holle, Anthony
Hardin, Michael	Messinger, Toly	Runski, John	Walters, Shelby
Havener, Michael	Millward, Paul	Russwurm, Dirk	Wamkeue, Rene
Hicks, Stuart	Monoski, Chris	Sandhu, Surinder	Wang, May
Hollingsworth, Rich	Morrisette, Guy	Schellhase, Hans	Wicks, Roger
Huff, Tim	Nguyen, Vuong	Schneider, Jeff	Williams, Randy
Jakob, Fredi	Nikoley, Ingo	Shekelton, Jim	

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IEEE PES TRANSFORMERS COMMITTEE MEETING

Thursday, April 18, 2002

Chair: H. J. Sim Vice Chair: K. S. Hanus

Secretary: D. J. Fallon

1.0 Chairs's Report, Remarks & Announcements – H. J. Sim

Chairman Jin Sim called the meeting to order at 8:00 A.M. Mr. Sim opened the meeting by covering a few announcements. These included notation of an omission from the Orlando Minutes, and an Agenda change, as follows:

- Loren Wagner pointed out that it was announced at Orlando, but not included in the Minutes, that Sal Bennon had passed away recently. In addition to being a member of the Committee, Sal served as Committee Chair for two years. The Committee recognizes Mr. Bennon's contributions and regrets his passing.
- Details of the Mike Lau's report as Host of this Meeting are included in the Report of the meetings Planning SC. The Committee appreciates the efforts of Mike and his associates in making this a successful meeting; a resounding round of applause was provided for Mike, his associates, and B.C Hydro.
- In an Agenda change, concerns related to the IEEE standards metrification issue were discussed at this time, rather than being held with other Old Business items. The Chair wished to cover this item when most members were in attendance, and asked Carl Niemann to address the meeting. IEEE requires that only metric units be used in all IEEE documents, with only limited specific exceptions allowed, and then only with specific IEEE approval. Carl pointed out that balloting for at least one distribution transformer standard (C57.12.34) may not be approved due to utility concerns for safety issues introduced by the elimination of English units, and that several utilities have indicated they will not accept certain product standards if they are approved by IEEE using only metric units. Carl initially introduced a motion initially worded to keep English units in transformer product standards, and then revised in discussion to continue with dual usage of metric and English units:
 - Motion: For safety and consistency in application, the IEEE/PES Transformers Committee requests that a dual system remain, with metric units listed first, and imperial or English units in parentheses, for all transformer product standards.
 - Forwarded by: Carl Niemann
 - Seconded by: Ron Stahara

The Chair facilitated discussion for several minutes, with safety issues and IEEE's guidelines reviewed. IEEE had planned gradual transition from dual unit usage through 1999, with start of exclusive use of metric units in 2000. Several utilities and members remain concerned with the possible negative safety impact. The Chair's intent is for the Committee's intent to be

expressed at the upcoming Standards Board in June, rather than approaching the IEEE Board of Governors directly. Finally the motion was repeated and a vote of members was called. The vote was 69 approved and 13 opposed, and the Motion was announced as carried.

NOTE: Subsequent review indicated these 69 votes did not represent a quorum of Members on the Committee Roster. 93 votes would be necessary for a 50% quorum. The membership roster will be reviewed and updated to reflect presently active membership, and results of this vote will be reported as a majority of members present.

- Details of the Mike Lau's report as Host of this Meeting are included in the Report of the meetings Planning SC. The Committee appreciates the efforts of Mike and his associates in making this a successful meeting; a resounding round of applause was provided for Mike, his associates, and B.C Hydro.

Jin Sim then covered the main points of his chair's report shown in full length below

1.1 Report on the Technical Council Meeting, January 27-31, 2002

Attendance for the Winter Meeting stood at approximately 1607 at the time of the Technical Council Meeting. The original expectation was 1900.

1.1.1 Chair's Report

The following is a highlight of the report:

Future PES Meetings

Chicago, SM02	July 21 – 25, 2002
Toronto, GM03	July 13 – 18, 2003
Denver, GM04	June 6 – 12, 2004

Future PES General Meeting Structure

Starting this year, two traditional PES Winter and Summer meetings will be combined in to an annual general meeting. The format of the general meetings will follow a split week format: Earlier part of the week for technical sessions and later part for technical committee meetings. We are planning to hold at least one of our committee meetings together with PES general meeting. General meeting schedule for 2003 and 2004 have been finalized and is available from our Meetings Planning subcommittee chair, Greg Anderson. We are currently planning for the Denver meeting in 2004 to try this format out (Note subsequent to preparation of Chair's Report: see discussion and vote to contrary in Section 3.5).

Technical Committee Meetings at General meetings

In an effort to make the PES General meetings more productive and better supported by the employers of the participants, Technical Committees (TCs) are encouraged to hold one of their meetings concurrent to general meetings each year. Jim Harlow and Don Russell presented a summary of the

decisions made after the Vancouver meeting. (More background information can be found in our website in the last Chair's report presented at our Orlando meeting. <http://www.transformerscommittee.org/>)

Jim presented the following:

With the inception of the one General meeting per year format starting in 2003, those technical committees which have met at Winter and Summer meetings would suddenly have only one venue planned by PES for their standards work or other activities. To fill this void, Technical Activities, using the services of Vita Feuerstein of IEEE Conference Management Services, will plan a "Supplement Meeting" or "Winter Standards Meeting" or other yet to be selected name Meeting. The primary motivation comes from T&D Committee, but the meeting is distinctly to be a gathering place for any committees, which wish to participate. The first such meeting is planned for Las Vegas in late January or early February of 2003. It is planned that there will be no PES administrative meetings at that time.

Jim Harlow introduced Vita Feuerstein, who has helped the Transformers committee with on-site meeting registration.

As a result of going to one general meeting a year some committees have a need to arrange a second meeting and PES provides a resource to help facilitate the activity. T&D have proposed to hold such a meeting in late January / early February of 2003 in Las Vegas and the Substations committee has expressed an interest in joining them. Requests have been made of all other committees to indicate if they also have an interest in meeting at that time. When all those interested are identified, the arrangements will be coordinated by Vita. (Chair's note: We considered participating in this "group" meeting with other related technical committees, such as T&D and Substation, but decided not to since the timing was bad for our traditional Spring and Fall meetings.)

With the one general meeting per year it is intended that each other year there would be the T&D show, in odd years and in even years something along the lines of PICA (Power Industry Computer Applications). Suggestions are solicited to refine the form and scope of this meeting but with the intention of having subject matter dealing with Power Systems types of interest and perhaps still using the PICA acronym but redefined. In the past the PICA conference was self contained and they reviewed the papers and organized all technical sessions. The new meeting would be run under the auspices of PES with the appointment of a TPC and organized along similar lines to T&D. It is intended that the first meeting will take place in the fall of 2004.

Don presented the following:

Don opened the discussion with the comment that none of the proposed changes were aimed at any specific technical committee or the technical committees collectively but that a change is needed for the greater good of PES. Resulting from discussions within industry it was identified that one general meeting per year would be better supported, supplemented by focused, smaller meetings on specific technical subjects. The objective of the general meeting is to provide a forum of wide technical interest that would attract those committees who do not now meet at the Winter and Summer meetings, as well as the current committees that do.

Power Quality Issues

It was proposed to create a new technical committee to handle the issues related to Power Quality during the PES Summer meeting in Vancouver. A scope of a proposed new committee on Power Quality was sent to TCOP for consideration but no recommendation on the scope or the formation of the new committee could be made. Currently all power quality is within the purview of the T&D committee and a motion was passed in TCOP to have this committee revise its scope to specifically include power quality, with the consideration that it may be appropriate to form a power quality subcommittee. Richard Piwko was tasked to work with the Power Quality Standards Coordinating Committee (SCC 22) and other IEEE entities interested to ensure that all buy into the changed organization and for PES to provide the leadership for these activities.

1.2 Transformers Committee Report to Technical Council

The following is an abbreviated version of my report to Technical Council for the Committee:

Committee Meeting Activities

Our Fall 2001 meeting was held October 14-18, 2001 in Orlando, Florida. Mr. Jim Hudock of Grand Eagle/Ohio Transformer and Mr. Joe Watson of Florida Power & Light Company were our hosts. In spite of the tense situation in the nation, 281 members and guests (and 69 companions) attended the meeting.

Generally, the Committee meets twice a year - in the fall and spring (usually during the last two weeks of March or first two weeks of April; and the last two weeks of October or first two weeks of November). Previously, our meetings have been 3-1/2 days in duration and begin on Sunday evening with a welcome reception and adjourn at noon on Thursday afternoon. This was the first meeting of the newly expanded schedule of 4-1/2 days in duration that begins generally on Sunday afternoon and runs through noon on Thursday.

Membership of the Transformers Committee currently stands at 181 members and 22 emeritus members. The regular members consist of 88 producers, 51 users, and 42 general interest. We also have one life member and one corresponding member. Our invitation list consists of approximately 500 engineers and managers in the transformer and utility industry. Attendance at our semi-annual meetings is typically near 350. Anyone with an interest in furthering the technology is welcome at our meetings. With active participation, an invitation is extended to become a member.

The Committee goals are to encourage open participation in transnationalization of transformer standards; to promote technical and educational endeavors such as panel sessions, technical presentations, peer review of technical literature on related subjects; and to support the efforts of the Power Engineering Society. In an effort of meeting one of the major goals of PES to attract more participation, the committee has committed itself to arrange at least two technical presentations/tutorials of educational nature at each meeting. At the last meeting, we held four technical presentations/tutorials and provided CEU accreditation for those who applied. The participation and acceptance of these four events "exceeded our expectations".

Future Meetings

Spring 2002:

April 14-18, 2002, Westin Bayshore Resort & Marina, Vancouver, BC, Canada. Contact Mike Lau, Host @ BC Hydro + (604) 528-3201, fax + (604) 528-3347 or one of the Committee Officers.

Fall 2002:

October 20-24, 2002, The Renaissance Hotel, Oklahoma City, OK, USA. Contact Joe Garza, Host @ Southwest Electric Company + (713) 849-9171, fax (713) 849-3958 or one of the Committee Officers.

Committee Officers

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2001 Winter Power Meeting Technical Sessions

The Transformers Committee is sponsoring one presentation session on transformers during the Winter Power Meeting.

Transformer Standards and Coordination Activities

The Transformers Committee takes responsibility for development and revision of IEEE Standards that fall within its scope. These Subcommittees currently have over fifty Working Groups and Task Forces preparing proposals for standards projects. Information on these standards and projects can be obtained by visiting our WWW homepage:

<http://www.transformerscommittee.org/>

Links to information on our future meeting and other information on Transformer Standards can also be found there.

Our WWW site will link you to the IEEE Standards Status Report that contains titles, abstracts, and names of contacts for each of the IEEE standards. This report is updated quarterly by the IEEE Standards Department. The status of transformer standards that are not listed in the IEEE quarterly report (either because they have been withdrawn, or they are not IEEE standards) are also included on the Transformers Committee Web site. The site is constantly improved by adding the committee-related items and technical information. Some of the examples of recent improvements are: posting minutes of various meetings, availability of on-line meeting reservations for upcoming meetings, an "e-mail reflector service" for efficiently sharing committee related information within the membership, a bibliography of transformer-related books and publications, technical presentations, etc.

Transformers Committee officers and Administrative Subcommittee members are also members of the USNC Technical Advisory Group to TC-14 (Transformers and Reactors). We continue to have productive meetings of the TAG at each Committee meeting.

1.3 IEEE/NEMA MOU issue

There was a special meeting of three technical committee chairs, Surge Protective Device (C62), Switchgear (C37) and Transformers (C57), and representatives of the IEEE-SA during the PES Winter meeting in New York. As a result of this meeting, a "Fact Sheet" was developed to describe the ASC (Accredited Standards Committees) C37, C57, and C62 committees and to explain the MOU signed between IEEE and NEMA to address these standards. (It is attached here – at end of the Chair's Report. If you receive this report electronically, double click the icon to open the document. If you receive this report in hardcopy format, the "Fact Sheet" can be obtained through any members of the Administrative Subcommittee or from our website when this report is posted there.)

During the February 25-26, 2002 meeting of the IEEE-SA board of Governors, a motion to terminate the Memorandum of Understanding with NEMA regarding ASC C37, C57, and C62 was approved. Since that time, there were several concerns raised mostly by the members of the ASC C37 Committee and IEEE-SA issued another memo to the members of the IEEE-SA and ASC. These documents

(NEMA_MOU_ltr, NEMA_MOU_term, and ASC_letter) are attached at the end of the Chair's Report.

1.4 Annual Report to PES

I presented the Annual Report to PES as below:

IEEE Power Engineering Society *Entity Annual Report 2001*

Entity: Transformers Committee

Chair: H. Jin Sim

Significant Accomplishments in 2001:

1. We continue to meet twice year - in the spring and fall. We have approximately 80 separate activities at each meeting. Due to increased activities, we have now expanded our meeting from a 2-1/2 day schedule to a 3-1/2 day schedule (Sunday evening until Thursday noon).
2. Joint copyrights are now established with NEMA on the associated standards and guides. These "co-owned" documents are presently under revision and reaffirmation by the Transformers Committee under the IEEE PAR.
3. Technical presentations & tutorials are now an integral part of our meetings. Presentations on current topics were made at both the spring and fall meetings and they were well attended. We are also now providing accredited CEU's for those who attend these sessions. Adding these presentations & tutorials in two dedicated meeting timeslots was our response to one of the new educational goals of PES.
4. Due to some "marketing efforts" within our Committee, we have seen a welcomed increase in attendance from foreign participation at our meetings, especially from Eastern Asia, Mexico and South America.
5. We have switched to all electronic balloting.

Benefits to Industry from the 2001 Work:

We judge that the work of our Committee greatly benefits our industry and related industries.

1. Many experts in our field are aging and we recognize that our combined knowledge must be retained for future generations. We are developing methods of "intellectual transfer" that will pass that knowledge to our younger participants. Newly developed educational and training opportunities, and a coordinated effort to further develop our web-site

(www.transformerscommittee.org), are examples of how we are attempting to disseminate the experience and knowledge of our members.

2. Several standards and guides were developed and/or revised. The development of a new standard for Smoothing Reactors for HVDC Application is an example of new documentation completed in 2001.
3. Efforts to harmonize with IEC are steadily progressing in several working groups. We are now mindful of this focus with all our meetings.
4. We usually offer a "technical tour" adjacent to each meeting. This often consists of a tour of a nearby transformer manufacturing plant. This event provides companies the opportunity to stay in contact with major manufacturers while maintaining a non-commercial, technical focus during our meeting.

Benefits to Volunteer Participants from the 2001 Work:

Our attendees often state that they are under pressure from their managers to justify attendance at our meetings. Some of our responses to this need are:

1. Educational and training opportunities are now available to meeting attendees. Presented at the last meeting was a tutorial on transformer inrush currents and a presentation on how standards, specifications, and design are related to each other. Presentations on the metrification of standards and a new equipment monitoring technology were another examples of how we are educating our attendees.
2. Offering accredited CEU's is an example of how we are listening to our attendees. Many of our attendees are now required to furnish certified professional development hours for state license renewal. The response to this offering at our last meeting "exceeded our expectations".
3. Informing members and guests of our scope and organization by offering a "newcomers orientation" session at the previous meeting in October. This presentation was very well received.
4. An increased emphasis on awards and personal recognition (more certificates, plaques and "atta-boys").

Recognition of Outstanding Performance:

1. The Working Group on "IEEE Trial-Use General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission" was nominated for PES Working Group Recognition.
2. The Working Group on "Performance Characteristics and Dimensions for Outdoor Apparatus Bushings" has won the Technical Council Working Group Recognition Award.

Significant Plans for 2002:

1. In late 2001, we began a coordinated effort to "market" our activities and meetings to end-users. We judge that more users, especially public and investor-owned utilities and industrial users, need to send representatives to our meetings. We will continue this marketing effort into 2002.

Problems and Concerns:

1. Newly revised or affirmed specifications now comply with IEEE metrification requirements, but similar metrification efforts have not widely materialized in users' specifications or manufacturing practices.
2. Participation in standards activities by end-users needs to be encouraged more at the corporate level.
3. Many companies have reduced their travel budgets and have consequently impacted the attendance at our meetings.

Respectively submitted, H. Jin Sim, Chair

ATTACHMENT TO CHAIR'S REPORT: FACT SHEET

FACT SHEET
Action on MOU with NEMA Regarding
Co-Secretariat Relationship for
ASC C37, C57, and C62

And Continued Development of IEEE PES Standards

7 February 2002

As a result of a directive by the IEEE Board of Directors for IEEE entities to reduce costs, the IEEE-SA Board of Governors found it necessary to review its relationships with non-IEEE standards committees. At its November 2001 meeting, the IEEE-SA BoG passed a motion to examine these relationships with committees for which it has oversight responsibilities, including the Accredited Standards Committees (ASCs), and take appropriate action.

On 30 January 2002, IEEE-SA Board of Governors members Dick Holleman and John Pope, along with Judy Gorman and staff, met with chairs of the PES Switchgear Committee, Roy Alexander, Transformers Committee, Jin Sim, and Surge Protective Device Committee, Jon Woodworth, to advise that IEEE would be terminating its Memorandum of Understanding with NEMA regarding the co-secretariat relationship for ASC C37, C57, and C62.

The following items provide clarification for related issues:

The PES Switchgear Committee, Transformers Committee, and Surge Protective Device Committee will continue to develop its standards under IEEE-SA policy and operating procedures, as in the past.

IEEE standards (including standards, recommended practices, and guides) are submitted to the ANSI Board of Standards Review for approval as American National Standards. This includes any "C" designated standard. All such standards receiving ANSI recognition are published with the ANSI approval date on the inside title page.

A joint copyright agreement between NEMA and the IEEE gives the IEEE full exploitation rights to all C37, C57, C62 standards, including those whose copyright was previously solely owned by NEMA. This allows IEEE the right to sell or license these standards as appropriate, e.g., in a collection or subscription. The joint copyright agreement also provides the right to revise these standards.

With respect to trademarks to the respective "C" designations, NEMA and the IEEE have joint ownership to those marks as the both entities are registered as joint trademark owners with the US Patent and Trade Office. This includes all previously designated "C" standards, as well as any future standards to be designated with a "C" designation. Thus, IEEE committees can continue to use these "C" designations for their standards development work.

The current Memorandum of Understanding (MOU) between IEE and NEMA states that either party may terminate the MOU with 90-days notice. The IEEE-SA Board of Governors will consider a motion at its February 2002 meeting to dissolve the MOU between IEEE and NEMA regarding its co-secretariat relationships with ASCs C37, C57, and C62. Following the IEEE-SA BoG's action, a letter will be sent from IEEE to NEMA, advising IEEE's position regarding the MOU.

The IEEE-SA will continue to process simultaneous ballots for "C" committee balloting of IEEE PES documents as submitted until a change in policy is directed by the BoG.

In summary, it is important to reiterate that approval by a "C" committee is not required for the IEEE-SA to develop and publish a standard that is recognized by ANSI as an American National Standard. Any statement to the contrary is incorrect, and is not supported by IEEE-SA's governance, policy, and procedure.



5 March 2002

Mr. Frank Kitzantides
Vice President
National Electrical Manufacturers Association
1300 North 17th Street
Suite 1847
Rosslyn, VA 22209

Dear Frank,

The IEEE-SA Board of Governors, at its 25-26 February 2002 meeting, approved a motion to terminate the Memorandum of Understanding between IEEE and NEMA regarding ASC C37, C57, and C62. Attached is IEEE's notice of termination to NEMA regarding this MOU signed by both IEEE and NEMA in 1994.

Please be assured that the BoG thoroughly considered the input of NEMA and the ASCs, prior to making this most difficult decision. The BoG also considered its fiduciary responsibility to the IEEE-SA and ultimately had to make a business decision to change its current relationship regarding the co-secretariats with these respective committees. The business decision was made in the context of our 5-year business strategy, which includes a complete restructuring of our service model.

The BoG has asked that staff and volunteers provide NEMA and the ASCs sufficient information on our balloting processes to see what harmonization opportunities exist in IEEE's processes and procedures. In this we ask that you review the following background information:

In 1999, the IEEE-SA enabled formal organizational participation and voting, in addition to its long-held individual participation. As such, it is appropriate to note that the IEEE-SA is managing change to keep pace with the current needs of industry and the overall global standards environment. In this spirit, we invite the members of the ASCs to join any IEEE-SA ballot group to participate and cast their votes as an organization, company, or trade association. The streamlined process of having one ballot that combines individuals and organizations will eliminate costly duplication of actions, time, and resources. This process should be attractive to the participating organizations, enabling them to set an example to industry of good practices in today's business climate.

The IEEE-SA is at work to realize the full potential of our mixed balloting process. In this context we are aiming to have a full set of options for review by both of our organizations by early in the third quarter of 2002.

Mr. Frank Kitzantides
6 March 2002
Page - 2 -

We look forward to NEMA's support in focusing industry interests together. We believe this will strengthen the U.S. voice in the international standards community. We appreciate NEMA's comments, and we will make all efforts to factor in key inputs as we put future plans in place.

Very truly yours,



Judith Gorman
Managing Director,
IEEE Standards Association

Cc: Malcolm O'Hagan, President, NEMA
Clark Silcox, NEMA
Ted Olsen, Acting Chair, ASC C37
John Borst, Chair, ASC C57
Joe Koepfinger, Chair, ASC C62
Ben Johnson, President, IEEE-SA
John Estey, President, IEEE Power
Engineering Society
Roy Alexander, Chair, IEEE Switchgear Committee
Jin Sim, Chair, IEEE Transformers Committee
Jan Woodworth, Chair, IEEE Surge Protective
Device Committee
Karen Rupp, IEEE
Jerry Walker, IEEE
Terry deCourcelle, IEEE
Claudio Stanzola, IEEE
Sue Vogel, IEEE
Bob Dwyer, IEEE Legal Counsel
Amy Marasco, ANSI
Anne Caldas, ANSI
Jay Moskowitz, ANSI
James Thompson, ANSI

ATTACHMENT TO CHAIR'S REPORT: NEMA_MOU_term



5 March 2002

Via Certified RR and Regular US Mail

Mr. Frank Kitzantides
Vice President
National Electrical Manufacturers Association
1300 North 17th Street
Suite 1847
Rosslyn, VA 22209

RE: Memorandum of Understanding Between the IEEE and NEMA as Co-Secretariats of ASC C37, C57, and C62 – dated December 1994

NOTICE OF TERMINATION

Dear Frank:

As per the section entitled "Terms of this Memorandum" contained in the Memorandum of Understanding (MOU) cited above, kindly accept this correspondence as official notice that the IEEE hereby terminates said MOU effective 10 June 2002.

Thank you for your kind and immediate attention to this matter.

Yours truly,

A handwritten signature in black ink that reads "Judith Gorman".

Judith Gorman
Managing Director
IEEE Standards Association

Cc: Malcolm O'Hagan, President, NEMA
Clark Silcox, NEMA
Ted Olsen, Acting Chair, ASC C37
John Borst, Chair, ASC C57
Joe Koepfinger, Chair, ASC C62
Ben Johnson, President, IEEE-SA
John Estey, President, IEEE Power Engineering Society
Roy Alexander, Chair, IEEE Switchgear Committee
Jin Sim, Chair, IEEE Transformers Committee
Jon Woodworth, Chair, IEEE Surge Protective Device Committee
Karen Rupp, IEEE
Jerry Walker, IEEE
Terry deCourcelle, IEEE
Claudio Stanziola, IEEE
Sue Vogel, IEEE
Bob Dwyer, IEEE Legal Counsel
Amy Marasco, ANSI
Anne Caldas, ANSI
Jay Moskowitz, ANSI
James Thompson, ANSI

The Institute of Electrical and Electronics Engineers, Inc.

445 Hoes Lane P.O. Box 1331 Piscataway, NJ 08855-1331, USA Phone +1 732 562 3800 Fax +1 732 562 1571
www.ieee.org



6 March 2002

Dear IEEE-SA Members and ASC Members:

The purpose of this letter is to respond to your recent correspondence addressed to the IEEE-SA President, Ben Johnson, and the IEEE-SA Board of Governors (BoG), regarding IEEE's co-secretariat relationship with ASC C37, C57, and C62. We appreciate the opportunity to have heard your concerns prior to the 25-26 February 2002 BoG meeting and thank you for your interest and support of IEEE standardization.

The IEEE-SA Board of Governors, at its recent meeting, approved a motion to terminate the Memorandum of Understanding with NEMA regarding ASC C37, C57, and C62. Please be assured that the BoG thoroughly considered your input, as well as that of others, prior to making this most difficult decision. The BoG also considered its fiduciary responsibility to the IEEE-SA and ultimately had to make a business decision to change its current relationship regarding the co-secretariats with these respective committees. The business decision involved not only a review of budget considerations, but an evaluation that included a review of IEEE-SA capabilities to provide organizational input and the impact of a duplicative process on existing resources.

The evaluation of the situation has also shown that IEEE supports over 800 standards developing working groups; yet of the 14 committees in PES developing standards, these three committees, IEEE Switchgear, Transformers, and Surge Protective Device committees, supported a relationship with an accredited standards committee as an additional approval body.

It is the belief of the IEEE-SA Board of Governors and the IEEE-SA Standards Board, as well as the IEEE standards community, that the IEEE-SA provides the appropriate and necessary commitment to consensus for all IEEE standards development. With some 300-500 individuals participating in each of the respective ballot pools for the IEEE Switchgear, Transformers, and Surge Protective Device committees, IEEE-SA also captures the technical breadth and vast input from its members and constituents for each standard. As an ANSI-accredited organization, the IEEE-SA standards process contains the necessary structure to support the imperative principles of standards development, including consensus, balance, openness, and the right to appeal. These are the same criteria required for an accredited committee.

While historically, a member could only participate on a committee or ballot as an individual, IEEE-SA has enabled formal organizational participation and voting, much like the input or voting once only held by an ASC committee participant. As such, it is appropriate to note that IEEE-SA is changing to keep pace with the needs of the evolving global standards environment, and we invite those organizations participating on an ASC to join any IEEE-SA ballot group to participate and cast its vote as an organization, company, or trade association. It is worthy to note that almost all of the individual and organizational members participating in the ASCs already participate in IEEE ballots on various standards. This streamlined process of having one ballot that combines individuals and organizations will eliminate costly duplication and saves time. This process should also be attractive to the organizations participating in this effort, as an example for industry of lessening the financial burdens and duplicative efforts.

The BoG supports providing appropriate policy information to NEMA and other organizational members regarding a mixed entity ballot. In the very near future, we will be happy to share with you guidance on how organizations can participate on an IEEE standards ballot.

We look forward to your support toward a successful transition to a new model for participation and voting on standards developed by the IEEE Switchgear, Transformers, and Surge Protective Device committees. We appreciate your comments, as well as your dedication and your continued commitment to the IEEE-SA standards program. We will make all efforts to factor in key inputs as we put future plans in place.

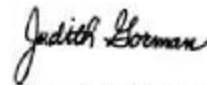
Very truly yours,

Ben Johnson



President,
IEEE Standards Association
bjohnson@thermon.com

Judith Gorman



Managing Director,
IEEE Standards Association
j.gorman@ieee.org

2.0 Approval of Minutes of October 18, 2001 – H. Jin Sim

With the exception of the omission of noting the passing of Sal Bennon (added to these Minutes), the Minutes of the Orlando meeting were approved as written.

3.0 Administrative Subcommittee – Jin Sim

Chairman Jin Sim covered the key points of the Administrative Subcommittee Meeting held on April 14, 2002. See the Administrative Subcommittee Meeting Minutes in full length below for details.

3.1 Introduction of members and guests

Chairman Sim called the meeting to order at 2:05 p.m., Sunday, April 14, 2002, in Oak 1,2 of the Westin Bayshore Resort and Marina in Vancouver, British Columbia, Canada.

The following members of the Subcommittee were present:

R. F. Dudley	B. K. Patel
C. G. Niemann	D. W. Platts
E. G. Hager, Jr.	G. Anderson
D. J. Fallon	T. A. Prevost
L. B. Wagenaar	J. Puri
H. J. Sim	C. W. Johnson, Jr. (for W. F. Patterson)
J. E. (Jim) Smith	J. E. (Ed) Smith
F. E. Elliott	J. Kelly (for F. Gryszkiewicz)
R. S. Girgis	

The following guests were present:

Bruce Forsyth	Terry DeCourcelle
Peter Balma	Jim Gurney
Jim Harlow	Mike Lau

3.2 Approval of the Orlando AdCom meeting minutes

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

3.3 Additions to and/or approval of the agenda

The previously communicated agenda was generally followed with no additions.

3.4 Meeting arrangements, host reports, and committee finances – G.W. Anderson

Greg's Meetings Planning SC report is included in the Committee meeting minutes. In addition, action was required on Greg's presentation of a proposal for sponsorship of breaks in order to contain costs to meeting registrants. The proposal is outlined in an attachment to his SC report, and will require availability of technical material when promotional material is provided by the break sponsor. There was considerable discussion related to concern for commercialization of the meeting, while recognizing a need to contain costs. At conclusion of discussion, a motion was made for a pilot program of break sponsorship to take place at the next meeting in Oklahoma City, with guidelines established to outline technical/informative requirements of sponsor materials displayed. The motion was approved by a vote of 13 to 1. Preliminary material presented at the meeting on break sponsorship follows:

COFFEE BREAK SPONSORSHIPS

Rising Costs of Meetings. Meeting expenses continue to rise. The total cost of each meeting has nearly doubled in the past 6 years. The total cost of coffee breaks alone at each meeting is \$10,000-15,000! In an effort to maintain a low meeting registration fee, we will offer sponsorship opportunities for the first time at the Fall 2002 Meeting (October 20-24, Oklahoma City).

Purpose. The purpose of coffee break sponsorships are to subsidize rising meeting costs and:

- ** Maintain a low meeting registration fee.
- ** Provide vendor-based, technical-focused material.
- ** Foster relationships between meeting attendees and manufacturers.

Type of Breaks. There are thirteen coffee breaks at each meeting. We offer only beverages (coffee, tea, pop, and bottled juice & water) at ten breaks. A "treat" (usually a cookie or brownie) is added at three afternoon breaks.

- ** Monday: 9:15 am, 10:45 am, 3:00 pm (with treat), 4:30 pm
- ** Tuesday: 9:15 am, 10:45 am, 3:00 pm (with treat), 4:30 pm
- ** Monday: 9:15 am, 10:45 am, 2:45 pm (with treat), 4:15 pm
- ** Thursday: 9:45 am

Table-top Posters. Two (2) stand-up 11" x 14" acrylic table-top poster holders will be provided for each sponsored break (one on the beverage/snack table, one on the brochure table). The Sponsor shall provide the proposed insert to the SC Chair of Meetings Planning for approval 2 weeks before the meeting. A sample insert can be viewed on the Committee web-site.

Brochure Table. Additionally, a 6-8 foot long table will be provided to display brochures and promotional materials. Commercial material is allowed, but at least half of the material must be of educational or technical focus (technical white-papers, new technology announcements, etc.). This will be strictly enforced!

Sponsor Opportunities. As a "pilot program", only seven sponsorship opportunities will be offered at the Vancouver Meeting. Participation at this meeting will determine future programs.

<u>Sponsor Type</u>	<u>Description</u>	<u>Opportunities at Fall 2002 Meeting</u>	<u>Cost per break</u>
Morning Break	without treat	4 (Mon, Tues, Wed, Thurs)	\$500
Afternoon Break	with treat	3 (Mon, Tues, Wed)	\$750

Larger companies (>US\$5M annual income) are encouraged to sponsor the more-expensive afternoon breaks. We hope to offer more sponsor opportunities at the next meetings in 2003. We also anticipate that all willing companies will be given an opportunity to sponsor a break over an 18-month period.

Sponsor Application. To indicate your interest to sponsor a coffee break, contact Greg Anderson for application material. Sponsorships will be awarded on a first-come-first-serve basis. After all sponsor opportunities at the next meeting are filled, additional sponsor opportunities will be scheduled for the next meeting.

3.5 IEEE General Meetings – H. J. Sim

Chairman Sim presented discussion on the IEEE PES General Meeting structure, in which the two traditional Winter and Summer Meetings will be combined into an annual General Meeting, with a request from PES that Technical Committee meetings be held in conjunction with General Meetings. This request is part of an effort to promote greater interaction and exchange of ideas between Committees. Details on this meeting structure are included in the Chair's Report in the Committee meeting minutes. Chairman Sim asked for discussion on a proposal for the Committee to meet at one of the upcoming General Meetings. Items of discussion included:

- New split week format of general meetings, with technical sessions in the early part of the week and the latter part allocating more time for Technical Committee meetings, and benefits of meeting with the General Meeting.
- Ability and need to work outside of the confines of the Committee meetings to provide for progress of work.
- Coordination of General Meeting schedules with our Committee schedules.
- Need to focus on Committee's main purpose – development and maintenance of standards and related documents.
- Travel budgets and corporate limitations on meeting attendance.

At the conclusion of discussion, the Chair requested consideration of a trial, holding a Committee meeting at the General Meeting in Denver in June 2004, and made a motion to that effect. With a vote of 6 in favor and 9 opposed, the motion was not approved. The Chair will report the result of this discussion and vote to PES.

3.6 IEEE delegation report ANSI C57 Committee – B. K. Patel

3.6.1 Ballots

The Delegation has responded to thirteen ballots since the meeting in Orlando, Florida.

Affirmative ballots were returned for the following:

C57.106/D7	Rev. Recirculation: Guide for Acceptance and Maintenance of Insulating Oil in Equipment
C57.131-1995	Reaffirmation: IEEE Standard Requirements for Load Tap Changers
C57.12.01/D3	Revision: Draft Standard General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid-Cast and/or Resin Encapsulated Windings
C57.12.23/D4	Rev.: Draft Standard for Underground Type, Self Cooled, Single-Phase, Distribution Transformers with Separable Insulated High Voltage Connectors; High Voltage 25000V and Below; Low Voltage 600V and Below; 167kVA and Smaller
C57.12.35	Reaffirmation: Standard for Bar Coding for Distribution Transformers
C57.124-1991	Reaffirmation: IEEE Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry Type Transformers
C57.12.58-1991	Reaffirmation: IEEE Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil
C57.123/D1.8	Recirculation: Guide for Transformer Loss Measurement
PC57.91-1995	Reaffirmation – IEEE Guide for Loading Mineral-Oil-Immersed Transformers
PC57.91-1995/Cor 1/D2.0	Draft Corrigenda to C57.91-1995, IEEE Guide for Loading Mineral-Oil-Immersed Transformers
PC57.135/D13	Second Recirculation: Draft Guide for the Application, Specification and Testing of Phase-Shifting Transformers
PC57.12.59/D4.0	Recirculation: Guide for Dry-Type Transformer Through-Fault Current Duration

An affirmative ballot was also returned for the following document. At last meeting, a ballot for this document was reported as returned affirmative and later cancelled by IEEE due to technical difficulties. Subsequently it was recirculated for balloting:

C57.21-1990 Reaff. Reballot: IEEE Standard Requirements, Terminology and Test Code for Shunt Reactors Rated Over 500kVA

3.6.2 IEEE/NEMA Copyright Agreement for C57 Documents

The following note was received by e-mail on March 12, 2002 from John A. Gauthier and Jeffrey B. Scanlon of NEMA in regards to a recent decision of IEEE to terminate its MOU with NEMA for the co-secretariat functions of ASC C37, C57 and C62.

NOTES ON IEEE-SA BOARD OF GOVERNORS DELIBERATION ON WITHDRAWAL FROM MEMEORANDUM OF UNDERSTANDING WITH NATIONAL ELECTRIC MANUFACTURERS ASSOCIATION

25 February 2002

Introduction

The IEEE-SA BOG provided an opportunity for NEMA and the Chairs of ASC C37 and C62 to make presentations on the proposed action of the BOG to withdraw from the Co-Secretariat as described in the MOU of 1994 between NEMA and the IEEE-Standards Board.

Issues

At a previous meeting of the IEEE-SA BOG (hereafter referred to as BOG), they conducted an investigation into what activities of the IEEE –SA Standards operation could be eliminated. This investigation was initiated by a request of the IEEE General Manager for all of the departments of the IEEE to reduce costs. Late in 2001, the IEEE Institute discovered that they were \$ 2 Million over their budget and predictions were that this was to get even worse in 2002 and 2003. According to the President of the BOG, the investigation indicated that, in assessing what activities could be reduced in the Standards Office, it feels that the cost of participating in the Co-Secretariat was an item that could be foregone. No value of the cost of this participation was given during the discussion on 25 February 2002. There was an emphasis on what is believed by IEEE to be a duplication of effort by having the IEEE Standards relating to the three Co-secretariat committees processed via the American National Standards Institute Accredited Standards Committee (ASC) process rather than just by IEEE, which is an ANSI Accredited Standards Organization.

Another issue that was a concern of BOG was the delay that was introduced by the ASC processing standard developed in IEEE. Mention was made that IEEE was failing to get approval in the ASC process because of some of the entities in the “C” committees failing to vote. NEMA acknowledges that this may have been a problem in the past, but in recent months they have initiated action to correct this problem.

We were advised at the beginning of the discussion that we had only 15 minutes to make our presentations. Prior to the meeting, Mr. Kitzantides of NEMA sent a letter to the members of the BOG addressing many of the concerns and offered to work with IEEE to solve any existing problems. In the letter, it was stressed that there is significant value in having IEEE standards relating to the disciplines of the three "C" committees processed for recognition as American National Standards via these committees. This letter discussed the different viewpoint that is provided by the "C" committees. This viewpoint is not that of an individual but the views of several organizations that have a material interest in the standard and are directly impacted by the standard.

The letter further offered to assist IEEE if the reason for the IEEE withdrawal from the ASC is due to their financial condition, as was portrayed in a letter to Mr. Koepfinger and was further amplified at this BOG meeting prior to the teleconference discussion of the issues.

Discussion of the Issue by the BOG

The prologue to the discussion was a motion made by BOG member Bruce McClung, formerly of Union Carbide, and seconded by Don Herman, Past Chair of IEEE-SA Standards Board and a former AT&T employee:

IEEE Board of Governors recommends to Dan Senese that the MOU between IEEE and NEMA be dissolved.

Because of the time limitation, Mr. Koepfinger did not use a slide presentation that was prepared but basically addressed the issues that were covered in Mr. Kitzantides letter to the BOG. He ended his presentation with a short list of requests to be considered by the BOG before they made their decision.

The Decision to terminate the Co-Secretariat should consider:

- The impact on effected industries
- Alternative financial solutions should be investigated.
- Current administrative problems should be analyzed to arrive at mutual solutions.
- International Standards are not always National Standards.

Mr. Olsen stressed the importance of an independent review of IEEE that is provided by the ASC, which is valuable for giving strong consideration to the safety issues. This is provided by the membership of safety and testing organizations who are members of the "C" committees.

Mr. Roy Alexander, a BOG member, made a comment that if finances were the problem IEEE could send out the ballots and all other administrative work associated with the ballot could be handled by NEMA. This point was very similar to one made by Mr. Olsen.

Before a vote was taken, Mr. Alexander asked Ms. Vogel to clarify what process would be followed if the motion was accepted and the MOU was dissolved. He asked if IEEE would

continue to seek the opinion of the ASC Committee. The response was that the IEEE Standards, once approved by the IEEE Standards Board, would be sent directly to ANSI for processing as an American National Standard. Ms. Vogel further noted that even today, if the IEEE standard is sent to the ASC and the ballot fails, the standard is still forwarded to ANSI under the Accredited Organization process for acceptance as an American National Standard.

The Chair of the BOG indicated that it was his intent that IEEE would continue to find a way to work with the ASC even if the motion was accepted. This was reaffirmed by the Ms. Gorman, Manager of Standards. But, when pressed for information on how this would be done, neither she nor the Chair had any solution to offer. Ms. Gorman suggested that it would be possible for NEMA to join IEEE as an organizational entity, since IEEE had established the opportunity for a combination of individual and entity voting on IEEE standards.

The BOG vote was taken on the motion by Mr. McClung. The vote was 11 in favor of the motion and one against. The negative vote was cast by Mr. Alexander.

The next step is for a formal letter to be sent from IEEE to NEMA to terminate the Co-Secretariats.

After the vote, Mr. McClung proposed a motion to the effect that IEEE work with the three ASCs to try to find a harmonious working relationship. This was defeated based on the fact that IEEE-SA Standards Board already has adequate vehicles for receiving input from outside organizations.

Prepared by;

J. L. Koepfinger

3.6.3 Present Roster

The roster of the IEEE Delegation to ANSI ASC C57 **effective January 1, 2002** is as follows:

Patel, B. K., Birmingham, AL - Chair, IEEE Delegation
Borst, J. D., Jefferson City, MO
Fallon, D. J., Newark, NJ
Hanus, K. S. (alternate), Fort Worth, TX
Prevost, T. A., St. Johnsbury, VT
Sim, H. J., Goldsboro, NC
Smith, H. D., Bluefield, VA

Bipin K. Patel, Chair

IEEE Delegation to ANSI ASC C57 Committee

3.7 Committee Service Awards – B. K. Patel

Bipin presented his report, which is included in the Committee meeting minutes.

3.8 Chair's report – H. J. Sim

Jin presented his report, which is included in the Committee meeting minutes.

3.9 Vice Chair's report – K. S. Hanus

Ken was in transit during the Administrative SC Meeting. His full report was submitted prior to the meeting, and is included in the Committee meeting minutes.

3.10 Secretary's report – D. J. Fallon

3.10.1 Membership Review

Voting Members – One new member, Richard Ladroga of Proteus Engineering Corp. (now with Doble Engineered Strategies), was added at the last meeting in Orlando. Also since Orlando, Jim Arnold has become an Emeritus Member.

Following these changes, and prior to the addition of new members at this meeting, membership stands at:

Members -		186
Classifications:		
	Producers -	91
	Users -	51
	General -	44
Life Members		1
Corresponding Members -		1
Emeritus Members -		20

The invitation list has approximately 449 names on it at this time.

3.10.2 New Member Applications

Applications have been submitted for Jim Fyvie of VA Tech Peebles Transformers and Craig Colopy of Cooper Power Systems. These applications were reviewed and approved at the Administrative Subcommittee meeting. (Subsequent Note: During the Main Meeting Jim and Craig were formally welcomed as Voting Members by the Committee Chair). Subcommittee Chairs are encouraged to forward new member applications to me at any time for review at the next AdsubCom meeting.

3.10.3 PES Directory Rosters

Subcommittee Chairs are requested to keep the rosters updated as they change constantly. Updated SC Rosters will be required during the summer for inclusion in the 2003 PES Directory. We will be discussing eventual use of a single database of Committee roster information, so that when a member or guest registers, any corrections to contact information can be used to automatically update Subcommittee and Working Group rosters.

3.10.4 Meeting Minutes

The Orlando Minutes were delayed in assembly and production. The complete Minutes were posted on the Committee website (<http://www.transformerscommittee.org/>) just prior to this meeting. Printed Orlando Minutes will be distributed at this meeting, with subsequent appropriate mailing as needed to those not attending this meeting. Printing and mailing costs will follow when this report is updated.

This delay in production of Minutes is regrettable. The Secretary will set up a schedule of milestones leading to timely availability of future Minutes, and will require the continuing cooperation of all WG Chairs. We will also be discussing plans to eventually eliminate printing and mailing of Minutes in favor of complete, timely, and user friendly availability on the Committee website. Webmasters Georges Vaillancourt and Susan McNelly have done an excellent job in posting the Minutes, and I salute them.

Subcommittee Chairs are requested to submit their minutes by May 31, 2002 for this meeting. The submittal should be an electronic file via e-mail, formatted in Word 2000 (or earlier versions) and it would be appreciated if the minutes are put in the format (numbering, etc.) as shown in the minutes. Please indicate total attendance count for each subcommittee, working group, and task force meeting in your minutes. Please do not send me a copy of attendance listing for this attendance count. If someone is preparing minutes for you please let them know these details about submitting the minutes for publication.

3.11 IEEE Standards Activities – Naeem Ahmad

There was no report of IEEE Standards activities presented at the meeting.

3.12 Standards Subcommittee - T. A. Prevost

3.12.1 Standards and coordination activities

Tom Prevost reviewed his report, which is included in the Committee meeting minutes.

In addition, there was a question from Richard Dudley on the status of C57.16 (Standard Requirements, Terminology, and Test Code for Dry-Type Air-Core Series Connected Reactors). This Standard was re-affirmed by IEEE, but failed in the ASC C57 ballot for ANSI certification based on lack of response to ballots by the EL&P and NEMA delegations. Richard requested understanding of the status as both an IEEE and ANSI approved document, and expressed concern at the potential for problems resulting from inattention of delegations to ASC balloting responsibility. The question was deferred as action is presently proceeding to resolve issues related to the ASC process, Terry deCourcelle (IEEE) indicated she would check with IEEE and comment on status.

Results of the C57 Collection Survey were discussed, and are reported in the Committee meeting minutes. IEEE appears to be receptive to the desire for availability of a C57 Collection on CD. One related comment noted concern that pdf file format in a CD format would not allow capability to search, and suggested consideration for including search capability.

PES has also asked for development of metrics for tracking progress of standards development, as a first step in process improvement. Tom reported average time for Transformers Committee standards

development, developed from review of t new and 12 revised standards, is 39 months, comparing reasonably well with the PES average of 37 months.

3.12.2 Documents submitted to the Standards Board

See the status reports in Attachments 1 and 2 at the end of the Minutes.

3.13 Subcommittee Activities - Subcommittee Chairs

3.13.1 Audible Sound and Vibration - Jeewan Puri

No Report

3.13.2 Bushings - F. E. Elliott

No Report.

3.13.3 Dielectric Tests - L. B. Wagenaar

Loren discussed treatment of altitude correction factors, including review of a liaison report from Art Molden on the April 2001 meeting of the High Voltage Test Techniques SubCommittee. Recommendation will be to continue with the present method of correction for all electrical equipment, including transformers and bushings. Question was also discussed as to whether the subject should be covered in the individual product standards. Chairman Sim suggested this is an item for WG review and recommendation.

3.13.4 Distribution Transformers – E. Smith

No Report.

3.13.5 Dry-Type Transformers – Chuck Johnson (for W. Patterson)

Chuck reported that the WG on Dry Type Thermal Evaluation will be working to combine C57.12.56 (Test Procedure for Thermal Evaluation of Insulation Systems for Ventilated Dry-Type Power and Distribution Transformers) and C57.12.60 (Test Procedure for Thermal Evaluation of Insulation Systems for Solid-Cast and Resin Encapsulated Power and Distribution Transformers).

3.13.6 HVDC Converter Transformers & Smoothing Reactors - Richard Dudley

IEEE 1277-2000 and IEEE C57.129-1999, which were “trial use” documents, were approved as “full use” standards at the March 2002 Standards Board Meeting. IEEE C57.129-1999 will require maintenance action by the end of 2004 and IEEE 1277-2000 will require maintenance action by the end of 2005, for either revision, reaffirmation, withdrawal, or extension.

3.13.7 Instrument Transformers - J. E. Smith

No report.

3.13.8 Insulating Fluids – J. Kelly (for F. J. Gryzkiewicz)

Joe responded with status on several items from the standards status report. C57.104/D10 is out to ballot. There was a 95% affirmative ballot on C57.106; and recirculation to address negatives so far has also resulted in a 95% affirmative ballot.

3.13.9 Insulation Life – D. W. Platts

No Report.

3.13.10 Performance Characteristics – R. S. Girgis

Ramsis raised a question on possible need for a standard to address core hot spot issues. Core hot spots can lead to gassing, leading to concern that there should perhaps be limits established and consideration given to development of standard or guide documents. Discussion would also be required to determine which SC would sponsor such work. Chairman Jin Sim asked that discussion take place involving Ramsis (Performance Characteristics), Joe Kelly (for Insulating Fluids), and Don Platts (Insulation Life) to formulate a recommendation on how best to proceed and which SC would sponsor if review and work on the subject is suggested.

Chairman Sim also asked about status of review for recommendation of possible work related to Frequency Response Analysis (FRA). A Tutorial Session is scheduled for the meeting. Jin suggested that Performance Characteristics take the lead on this subject, with liaisons set up with both the Dielectric Test and Power Transformers subcommittees.

Also discussed later in the meeting was the status of C57.133, the Short Circuit Test Guide. The intent was to get C57.133 published as a stand-alone document after separation from C57.12.90, and then to work on upgrades as necessary. IEEE has expressed concern for the condition of some of the figures used, but that is related to the condition of only available source document figures. PCS will coordinate discussion with IEEE, with Tom Prevost's assistance, to resolve this issue and move the document to approval and publication.

3.13.11 Power Transformers - E.G. Hager

No Report

3.13.12 Underground Transformers and Network Protectors – C. Niemann

No Report

3.13.13 Meetings & Planning - Greg Anderson

As indicated, Greg's report is included in the Committee meeting minutes.

3.14 Old Business

There were no items of old business to be covered.

3.15 New Business

3.15.1 Emerging Technology Coordinating Committee

The Emerging Technologies Coordinating Committee will be the agent through which PES hopes to assure that issues related to new technologies are properly addressed and integrated into the PES scope of activities. One concern is that if PES does not recognize and respond to needs for standards documents related to new technology applications impacting the PES sphere of influence, such standards will be developed without any coordinated PES input. As a first step, all PES technical committees are requested to provide input on possible emerging technology issues for review by the Coordinating Committee. Input or suggestions on possible topics should be brought to the attention of one of the Committee officers.

3.15.2 ASC C57 Main Committee Issue (Termination of IEEE/NEMA MOU)

Notes on the IEEE Board of Governors (BOG) deliberations related to withdrawal of the Memorandum of Understanding (MOU) with NEMA are included earlier in the Administrative SC Minutes, and further background documentation and discussion is included with the Chair's Report. Chairman Sim wished to discuss further the action planned by the Transformers Committee in response to the termination of the MOU, specifically how we will continue to address those documents for which we had taken over responsibility for maintenance from NEMA, and what processes can be used to gain ANSI approval for IEEE documents and assure IEEE input as needed to ANSI documents developed by others. Terri deCourcelle of IEEE reviewed IEEE's position, and a group discussion was held. Previously, the Accredited Standards Committee (ASC) process was used by ANSI to provide the opportunity for input from various delegations and interest groups (EL&P, IEEE, NEMA, governmental organizations, etc.) in approval of documents developed by IEEE and others as American national standards. Termination of the MOU terminated this process for ANSI approval. The IEEE SA process, in particular the open ballot process, seems to provide a balanced input from users and manufacturers, and at times the ASC process seems to have more of an impact of delaying schedule of full approval rather than providing to additional constructive input to the development of documents. As a contrasting point, it was noted that some users have expressed concern that NEMA developed documents proceeding without benefit of the ASC process might not provide for adequate input from a variety of users. IEEE, as an organization, will not have a mechanism to provide input into NEMA developed documents submitted for ANSI approval, and vice versa. As a followup to IEEE's action in termination of the MOU, NEMA indicated that the MOU on joint copyright of several documents by NEMA and IEEE was also terminated.

Jin advised that the Transformers Committee will continue to develop its standards under IEEE SA policies and operating procedures. All WG's should proceed under appropriate approved IEEE PAR's (project approval request), and following this procedure will assure appropriate indemnification of IEEE members in the standards development process. Jim Gurney of BC Hydro provided some input on response of other technical Committees related to the withdrawal of the MOU.

PES President John Estey is also establishing a task force to review and recommend procedures to allow standards development to continue smoothly into the future.

As summary comment on this issue, repeated below is the message Chairman Sim's provided on the Committee website:

As most of you are aware, IEEE terminated the Memorandum of Understanding (MOU) between the IEEE and the NEMA as Co-Secretariat of Accredited Standards Committees (ASCs) C37, C57 and C62. The notification was sent to NEMA on March 5, 2002 and the effective date is June 10, 2002. NEMA then responded with a letter indicating that the termination of the Co-Secretariat MOU would also mean that the Joint Copyright agreement is no longer in effect. In the letter, dated April 16, 2002, NEMA indicated that it will take appropriate actions to assure that non-IEEE standards will continue to be developed and updated with the direct participation of all materially affected groups. Our Committee has many Working Groups in the process of revising documents that IEEE and NEMA jointly own copyrights. We have a Task Force, reporting to the IEEE-SA Standards Board Procedures Committee, with both PES and ASC member participation to discuss the issues and make recommendations. As far as our Working Groups responsible for those documents that IEEE and NEMA owns joint copyrights, we will continue what we are currently doing (PAR under IEEE-SA, indemnified by IEEE, etc.) until the Task Force comes up with a different recommendation.

3.15.3 Other New Business – Scanning Errors in Reaffirmation Documents

Don Platts brought up a concern for translation errors in reaffirmation documents, apparently due to the scanning process, that are not detected until the reaffirmation ballot is out. This has occurred at least with one document each under sponsorship of the Insulation Life and Performance Characteristics SC's, and adds unnecessary complication and time to the reaffirmation process. Tom Prevost has had discussion with IEEE on this issue. IEEE recognizes the concern, and has initiated additional review of documents in the reaffirmation process. An additional step planned to address this will be for a copy of the electronic file version of reaffirmation document to be submitted to the WG Chair for review prior to being balloted for reaffirmation.

There were no other items of New Business.

3.16 Adjournment

Chairman Sim adjourned the meeting at 5:25 p.m.

3.0 Administrative Subcommittee (cont'd)

Respectfully submitted,

D. J. Fallon, Secretary

IEEE/PES Transformers Committee Meeting Locations

<u>Year</u>	<u>Spring</u>	<u>Fall</u>	<u>Committee Chair</u>
2003	Raleigh, NC	Pittsburgh, PA	Sim
2002	Vancouver, BC, Canada	Oklahoma City, OK	Sim
2001	Amsterdam, The Netherlands	Orlando, FL	Patel
2000	Nashville, TN	Niagara Falls, ON, Canada	Patel
1999	New Orleans, LA	Monterey, Mexico	Matthews
1998	Little Rock, AR	Guanajuato, Mexico	Matthews
1997	Graz, Austria (summer)	St. Louis, MO	Binder
1996	San Francisco, CA	Burlington, VT	Binder
1995	Kansas City, MO	Boston, MA	Harlow
1994	Dallas, TX	Milwaukee, WI	Harlow
1993	Portland, OR	St. Petersburg, FL	Borst
1992	Birmingham, AL	Cleveland, OH	Borst
1991	Phoenix, AZ	Baltimore, MD	Veitch
1990	Denver, CO	Montreal, PQ, Canada	Veitch
1989	Chicago, IL	Charlotte, NC	Veitch
1988	Washington, DC	Long Beach, CA	Compton
1987	Ft. Lauderdale, FL	New Orleans, LA	Compton
1986	Little Rock, AR	Pittsburgh, PA	Yannucci
1985	St. Louis, MO	Toronto, ON, Canada	Yannucci
1984	Vancouver, BC, Canada	Boston, MA	Savio
1983	Atlanta, GA	Detroit, MI	Savio
1982	Los Angeles, CA	Philadelphia, PA	McNutt
1981	Portland, OR	Phoenix, AZ	McNutt
1980	Williamsburg, VA	Milwaukee, WI	Bonucchi
1979	San Diego, CA	Houston, TX	Bonucchi
1978	Miami, FL	Chattanooga, TN	Bennon
1977	Charlotte, NC	Montreal, PQ, Canada	Bennon
1976	New Orleans, LA	San Francisco, CA	Honey
1975	Lakeland, FL	Denver, CO	Honey

4.0 Editor's Report – M. Christini

Between October 2001 and April 2002, a total of (59) papers in the transformer area (including both new and revised papers) were submitted to IEEE Transactions on Power Delivery. During this time, (26) reviews were completed and (33) reviews are in-progress. For completed reviews, the recommendations were: Accept without changes (16), Accept with mandatory changes (5), and Reject (5).

I would like to thank all of the reviewers who volunteered for this effort and donated many hours of their time.

Mark Christini
Editor, IEEE Transactions on Power Delivery

Accept without changes

TR120401999RA1	Impedances For The Calculation of Electromagnetic Transients Within Transformers	Mombello
2000TR166RA1	Recognition of Impulse Fault Patterns in Transformers Using Kohonen's Self Organizing Feature Map	Chatterjee
2000TR312RA1	Unit Commitment of Main Transformers For Electrified Mass Rapid Transit Systems	Chen
2000TR329RA1	GIC Occurrences and CIC Tests For 400 KV System Transformer	Lahtinen
2000TR467RA1	A Novel Autotransformer Design Improving Power System Operation	Andrei
2000TR537RA1	Thermal Overload Tests On A 400 MV A Power Transformer With A Special 2.5 Pu Short Time Loading Capability	Nordmann
2000TR595RA1	Distribution Transformer Load Modeling Using Load Research Data	Lu
2000TR807RA1	Transfer Function Method To Diagnose Axial Displacement and Radial Deformation of Transformer Windings	Feser
2001TR012RA2	Calculation of Core Hot-Spot Temperature in Power and Distribution Transformers	TeNyenhuis
2001TR027.R1	Sensitivity of Transformer's Hottest-Spot and Equivalent Aging To Selected Parameters	Pahwa
2001TR066RA1	Structure of Transfer Function of Transformers With Special	Satish

	Reference To Interleaved Windings	
2001TR077RA1	Geomagnetically Induced Current Effects On Transformers	Price
2001TR198.R1	No-Load Losses in Transformers Revisited: Tests and A New Model	Gaudreau
2001TR217RA1	Three-Phase To Four-Phase Transformer For Four-Phase Power Transmission Systems	Guangye
2001TR267	Modeling Transformers With Internal Incipient Faults	Butler
2001TR475.R1	Introducing the Family of "Sen" Transformers: A Set of Power Flow Controlling Transformers	Sen

Accept with mandatory changes

TR9 028 1999	Characterizing Internal Faults in Distribution Transformers Using Computer Simulation And Field Experiments	Butler
2001TR012RA1	Calculation of Core Hot-Spot Temperature in Power and Distribution Transformers	TeNyenhuis
2001TR244RA1	Condition Assessment of Power Transformer On-Load Tap-Changers Using Wavelet Analysis and Self-Organising Map: Field Evaluation	Kang
2001TR419	A Newly Modified Forced Oil Cooling System and Its Impact On In-Service Transformer Oil Characteristics	Wahab
2001TR443	Measurement and Modeling of Hysteresis Loops of Steel Running Rails Used in Railway Power Systems	Y. Wang

Reject

2001TR033	Leakage Inductance of A Distribution Transformer With Two Symmetrical Windings	Raissios
2001TR382	A Reliable and Transparent Expert System For Impulse Fault Diagnosis in Distribution and Power Transformers	Chakravorti
2001TR411	Thermal Ageing Prediction of Transformer Oil and PVC of High Voltage Cables Using Neural Networks	Feliachi
2001TR430	Thermal Behavior of A Toroidal Transformer Through A Mixed Model	Orace
2001TR481	Calculation of Transformer Leakage Reactances Using	Faiz

	Electromagnetic Energy Technique	
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In Progress

TR120151999RA1.R1	Transformer Phase Coordinate Models Extended For Grounding System Analysis	Nahman
2000TR093.R1	Accurate Modeling of Core-Type Distribution Transformers For Electromagnetic Transient Studies	Noda
2000TR609.R1	Measurement of ΔI Characteristics of Asymmetric Three-Phase Transformers and their Applications	Fuchs
2001TR178.R1	Estimating Overpressures in Pole-Type Distribution Transformers Part I: Tank Withstand Evaluation	Hamel
2001TR182.R1	Estimating Overpressures in Pole-Type Distribution Transformers Part II: Prediction Tools	Hamel
2001TR253.R1	Design of A High Power Brushless Linear Variable Transformer	Faiz
2001TR282.R1	Experience With Return Voltage Measurements For Assessing Insulation Conditions in Service Aged Transformers	Saha
2001TR394.R1	Reducing Losses in Distribution Transformers	Olivares
2001TR454.R1	New Solid-State On-Load Tap-Changers Topology For Distribution Transformers	J. Faiz
2001TR466.R1	Real-Time Dynamic Loading and Thermal Diagnostic of Power Transformers	Lachman
2001TR495.R1	Fast Ferroresonance Suppression of Coupling Capacitor Voltage Transformers	Iravan
2001TR580.R1	A Novel Extension Method For Transformer Fault Diagnosis	M-H Wang
2001TR452	Study of Abnormal Electrical Phenomena Effects On GSU Transformers (Part 1 of 2: Effects of Switching Transients)	Y. Liu
2001TR453	Study of Abnormal Electrical Phenomena Effects On GSU Transformers (Part 2 of 2: Effects of SFC Operation and Lightning)	Y. Liu
2001TR632	Evolving Neural Nets For Fault Diagnosis of Power Transformers	Y-C Huang
2001TR649	Derating of Distribution Transformers For Non-Sinusoidal Load Currents Using Finite Element Method	Faiz
TPWRD-00010-2002	Transformer Design Optimization with Consideration of Restrained	Chih-Kun

	Inrush Current and Low Leakage Inductance	
TPWRD-00031-2002	Experimental Development of Superconducting Fault Current Limiting Transformer (SFCLT) for Electric Power System	Hiroaki
TPWRD-00037-2002	Data Mining Approach for Analysis of Power Transformer Dissolved Gas Records Using the Self-Organising Map	Thang
TPWRD-00039-2002	A Study on Transformer Loading in Manitoba -- Part I: Peak-load Ambient Temperature	X. Li
TPWRD-00040-2002	A Study on Transformer Loading in Manitoba -- Part II: Loading Capability	X. Li
TPWRD-00044-2002	Research on a New and Efficient Spherical Adsorbent for On-Site Regeneration of Transformer Oil	Peng
TPWRD-00049-2002	PSpice Computer Model of a Non-linear Three-phase Three-legged Transformer	Pedra
TPWRD-00057-2002	Seismic Response of Transformer-Bushing Systems	Ersoy
TPWRD-00058-2002	A New Data Mining Approach for Dissolved Gas Analysis of Oil-Insulated Power Apparatus	Y-C Huang
TPWRD-00066-2002	Coolant Flow Distribution and Pressure Loss in ONAN Transformer Windings - Part 1: Theory and Model Development	J. Zhang
TPWRD-00067-2002	Coolant Flow Distribution and Pressure Loss in ONAN Transformer Windings - Part 2: Optimization of Design Parameters	J. Zhang
TPWRD-00106-2002	Proposed Standards for Frequency Conversion Factors of Transformer Performance Parameters	teNyenhuis
TPWRD-00109-2002	Computation of Very Fast Transient Overvoltages in Transformer Windings	Popov
TPWRD-00117-2002	Power Flow Analysis in Transformers by Electromagnetic Fields	T. Saha
TPWRD-00140-2002	A wide-band lumped circuit model of eddy current losses in a coil with a coaxial insulation system and a stranded conductor	Holmberg
TPWRD-00145-2002	Temperature Responses to Step Changes in the Load Current of Power Transformers	H. Nordman
TPWRD-00152-2002	Harmonic Frequency Leakage Fluxes in 3-Phase, 3-Winding Converter Transformers	Forrest

5.0 Vice Chair's Report – K. S. Hanus

The vice chair covered the main points of his report shown in full length below.

5.1 PES Technical Council Committees

The following are reports on activities of PES Committees on which the Vice Chair serves as Committee representative. All of the meetings reported were held at the 2002 Winter Meeting in New York, NY on January 27 – 31, 2002.

5.1.1 Technical Sessions

Here are the high points of the discussions held and the report presented at the meeting:

- a. Power Engineering Review will continue to publish Technical Committee promotional articles. The emphasis should be on present and future activities. The length of the article is at the discretion of the author. It may include: technical information, announcement of new working groups and task forces, membership information, and recruitment's for new members. Each committee will submit their material by their due date as scheduled. Transformers Committee will have one article submitted for this in 2002.
- b. Don Russell, Vice President – Meetings, gave a short presentation on the proposed change in meeting format with an emphasis on getting the Technical Committees to hold their meetings concurrently with the new PES Annual Meeting. The final format of the PES General meeting schedule was presented which significantly improves poster sessions while minimizing potential conflicts with technical committee activities by allocating most of the second half of the week for committee meetings.
- c. Carey Cook, TPC for the 2002 Summer Meeting gave a report on the technical program for the meeting to be held in Chicago. Carey stated that his program would be based on six tracks which included new technologies in the areas of alternate energy supplies, power quality, and distributed generation. This meeting will have technical sessions organized with the following theme and tracks.

The theme of the meeting is *Taking Technology to New Heights*.

Track 1: Securing New / Alternate Sources of Energy

Track 2: Improving Power Delivery

Track 3: Advancing Reliability and Power Quality

**Track 4: Improving Customer Service Using Innovative Measurement,
Control and Computational Technologies**

Track 5: Surviving New Markets and New Structures

5.1.2 Organization and Procedures Committee

5.1.2.1 Technical Committee Activity Reports

A significant discussion took place on the subject of "Proposed new technical committee on Power Quality" during the New York TCOP meeting. It was finally decided to expand the Transmission and Distribution Committee's current activities on Power Quality matters in coordination with the SCC 22 and other interested groups.

5.1.2.2 Revision of the Technical Council Organization and Procedures Manual

Our committee O&P Manual has been updated to reflect several changes we have made and was approved during the New York TCOP meeting.

5.2 Technical Paper Reviews

5.2.1 Technical Paper Review Summary

Between October 2001 and April 2002, a total of (59) papers in the transformer area (including both new and revised papers) were submitted to IEEE Transactions on Power Delivery. During this time, (26) reviews were completed and (33) reviews are in-progress. For completed reviews, the recommendations were: Accept without changes (16), Accept with mandatory changes (5), and Reject (5).

5.2.2 Technical Paper Session at 2002 Winter Meeting

One transformer session was held at the New York, NY meeting, January 27 – 31, 2002. There were five proceedings papers.

5.2.3 Technical Paper Session at 2002 Summer Meeting

We will have two paper sessions for 3 proceedings papers and 6 transactions papers during the IEEE/PES 2002 Summer meeting in Chicago, IL, July 21 – 25, 2002.

Respectfully submitted,

K.S. Hanus, Vice Chair

6.0 Transformer Standards - T. A. Prevost

Standards Sub Committee met on Wednesday April 17, 2002 with 8 members and 22 guests.

6.1 Report of WG's

- C57.12.00 Subhash Tuli
 - o C57.12.00 Par is approved should submit revised stand for ballot next month.
- C57.12.90
 - o C57.12.90 Par is approved should submit revised stand for ballot next month
- C57.12.80 Tom Traub
 - Has been submitted to REVCOM for approval. Expect approval in April.
 - We will start a WG for continuous Revision of C57.12.80 Definition and Terms after C57.12.80 is approved. Sauraub Gosh will start new WG for next revision.
- WG on Guide for Metrification of Transformer Standards – Dudley Galloway
 - Posted guide on Transformer Comm Web Site
 - Reviewed metrification guide with WG.

6.2 TF on Grounding Transformers, Steve Schappell, Chair.

C62.91 (IEEE 32) Task Force: Revision to Requirements and Tests for Neutral Grounding Devices

1. The first meeting was held at 3:15 pm on Monday, April 15, 2002.
2. There were 9 attendees, and all requested membership.
3. Background information: Edgar Taylor has been working to revise the document with Transformers Committee help. The document expires in 2002.
4. Tom Prevost will verify status of PAR for C62.91. Attendees would like to make it a C57 Standard. Additionally, the Surge Protective Devices Committee does not want lengthy material for the devices. They state that we should put it into a C57 Standard, and refer to it in the C62 Standard.
5. Tom Prevost will provide direction to the group concerning options:
 - a. Leave the Standard as C62.91
 - b. Split the Standard into two Standards C62 & C57
 - c. Write a new Standard for C57

1. Discussions were held concerning pulling in experts on capacitors and resistors to improve these sections.
2. Meeting was adjourned at 3:50 pm.

6.3 Summary of Standards Activity

We have 70 Standards in Transformer Committee

- Based on a 5 Year cycle this means that 14 Standards need to be reviewed each Year.
- Presently we have 22 Active Projects. 11 for New Standards, 11 for revision of existing standards.

6.4 Electronic Balloting

We will be doing all future ballots electronically. This requires that everyone who would like to participate in Transformer Committee ballots have their correct information (particularly e-mail address) in the IEEE balloting database. This can be done by accessing the IEEE web site below:

<http://standards.ieee.org//dbllballoting/ballotform.html> - will put on Web Site

6.5 C57 Collection / Phone book

- Still available however, 1998 version
- C57 collection is available online \$515/year. This contains:
 - Continuously available updates
 - Draft standards
 - Withdrawn/superseded standards
- IEEE is exploring providing the "phonebook" on CD-ROM.

6.6 Standards Activities since the October, 2001 Meeting

Significant items from Tom Prevost's April 14, 2002, report to the committee include:

NESCOM (PARs) – December 5, 2001:

Target Extension Requests:

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

Recommendation: Approve target extension request until December 2004.

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

Recommendation: Approve target extension request until December 2004.

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

Recommendation: Approve target extension request until December 2002.

NEW PARS:

PC57.12.10 (PE/TR) Standard Requirements for Liquid-Immersed Power Transformers (Deferred from the December 2001 meeting)

Recommendation: At the request of the sponsor, consideration of this PAR has been deferred to June 2002.

PC57.12.36 (PE/TR) Standard Requirements for Liquid-Immersed Distribution Substation Transformers (Deferred from the December 2001 meeting)

Recommendation: At the request of the sponsor, consideration of this PAR has been deferred to June 2002.

PC57.143 (PE/TR) Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components (Deferred from the December 2001 meeting)

Recommendation: Approve new PAR until December 2006.

PC57.144 (PE/TR) Guide to Metric Conversion of Transformer Standards

Recommendation: Approve new PAR until December 2006 (11 approve, 1 disapprove, 0 abstain).

REVISED PARS:

PC57.13.5 (PE/TR) Test Requirements of Instrument Transformers of a Nominal System Voltage of 115 kV and Above (Deferred from the December 2001 meeting)

Recommendation: Approve revised PAR until December 2002.

February , 2002:

PARS FOR THE REVISION OF STANDARDS:

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

Recommendation: Approve PAR for the revision of a standard until December 2006.

TARGET EXTENSION REQUESTS:

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

Recommendation: Approve target extension request until December 2002.

NEW PARS:

PC57.12.31 (PE/TR) Standard for Pole Mounted Equipment - Enclosure Integrity

Recommendation: Approve new PAR until December 2005.

PC57.12.32 (PE/TR) Standard for Submersible Equipment - Enclosure Integrity

Recommendation: Approve new PAR until December 2005.

PARS FOR REVISIONS OF STANDARDS:

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

Recommendation: Approve PAR for the revision of a standard until December 2005.

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

Recommendation: Approve PAR for the revision of a standard until December 2005.

REVCOM - 5 December, 2001 Recommendations:

NEW:

PC57.135/D13 (PE/TR) Guide for the Application, Specification and Testing of Phase-Shifting Transformers

Recommendation: APPROVE

REVISION:

PC57.12.59/D4.0 (PE/TR) Guide for Dry-Type Transformer Through-Fault Current Duration

Recommendation: APPROVE

5-YEAR REVIEW OF STANDARDS:

637-1985 Guide for the Reclamation of Insulating Oil and Criteria for Its Use

Sponsor states that a reaffirmation is in progress and requests a two-year extension.

Recommendation: Extend until December 2002.

C57.12.20-1996 Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller, High-Voltage 34 500 Volts and Below; Low-Voltage, 7970/13 800Y Volts and Below

Sponsor has submitted a PAR for revision to NesCom.

Recommendation: Extend until the expiration of the PAR for PC57.12.20.

C57.12.35-1996 Standard for Bar Coding for Distribution Transformers

Sponsor states that a reaffirmation is in progress and requests a two-year extension.

Recommendation: Extend until December 2002.

C57.12.40-1993 Standard for Requirements for Secondary Network Transformers - Subway and Vault Types (Liquid Immersed)

Sponsor has submitted a PAR for revision to NesCom.

Recommendation: Extend until the expiration of the PAR for PC57.12.40.

C57.12.58-1991 (R1996) Guide for Conducting a Transient Voltage Analysis of a Dry Type Transformer Coil

Sponsor states that a reaffirmation is in progress and requests a two-year extension.
Recommendation: Extend until December 2002.

C57.19.03-1996 Standard Requirements, Terminology, and Test Code for Bushings for DC Applications

Sponsor states that a reaffirmation is in progress and requests a two-year extension.
Recommendation: Extend until December 2002.

C57.19.100-1995 Guide for Application of Power Apparatus Bushings

Sponsor states that a reaffirmation is in progress and requests an extension.
Recommendation: Extend until December 2002.

C57.21-1990 (R1995) Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA

Sponsor states that a reaffirmation is in progress and requests a two-year extension.
Recommendation: Extend until December 2002.

C57.91-1995 Guide for Loading Mineral-Oil-Immersed Transformers

Sponsor states that a reaffirmation is in progress and requests an extension.
Recommendation: Extend until December 2002.

C57.111-1989 (R1995) Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers

Sponsor states that a reaffirmation is in progress and requests a two-year extension.
Recommendation: Extend until December 2002.

C57.124-1991 (R1996) Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry Type Transformers

Sponsor states that a reaffirmation is in progress and requests a two-year extension.
Recommendation: Extend until December 2002.

C57.131-1995 Standard Requirements for Load Tap Changers

Sponsor states that a reaffirmation is in progress and requests a two-year extension.
Recommendation: Extend until December 2002.

20 March 2002:

TRIAL-USE UPGRADE TO FULL-USE:

1277-2000 (PE/TR) IEEE Trial Use General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission

[no negative comments received during trial-use period, which is now complete; Sponsor requests elevation of status to full-use]

Recommendation: Elevate status of standard from trial-use to full-use. Editorial staff will be notified to implement the necessary changes. IEEE Standards Dept. database will be updated to reflect that the standard will be due for reaffirmation in 2005.

C57.129-1999 (PE/TR) IEEE Trial Use Standard General Requirements and Test Code for Oil-Immersed HVDC Converter Transformers

[no negative comments received during trial-use period, which is now complete; Sponsor requests elevation of status to full-use]

Recommendation: Elevate status of standard from trial-use to full-use. Editorial staff will be notified to implement the necessary changes. IEEE Standards Dept. database will be updated to reflect that the standard will be due for reaffirmation in 2004.

PARs Due to Expire at the end of 2002:

- P1524 Guide for the Definition of Thermal Duplicate Liquid-Immersed Distribution, Power, and Regulating Transformers
- PC57.104 Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers
- PC57.106 Guide for Acceptance and Maintenance of Insulating Oil in Equipment
- PC57.113 Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors
- PC57.12.25 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
- PC57.12.33 Guide for Distribution Transformer Loss Evaluation
- PC57.12.34 Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 2500 kVA and Smaller: High-Voltage, 34500 GrdY/19920 Volts and Below; Low Voltage, 480 Volts and Below
- PC57.12.80 Standard Terminology for Power and Distribution Transformers
- PC57.13 Standard Requirements for Instrument Transformers

- PC57.13.5 Standard for Test Requirements for Instrument Transformer of a Nominal Voltage of 115 kV and Above

- PC57.133 Guide for Short Circuit Testing of Distribution and Power Transformers

- PC57.19.00 Standard General Requirements and Test Procedure for Power Apparatus Bushings

Standards to be Withdrawn (unless specific action taken to reaffirm, revise, or extend):

637-1985 IEEE Guide for the Reclamation of Insulating oil and Criteria for Its Use

1276-1997 IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Power Transformers

C57.12.35-1996 IEEE Standard for Bar Coding for Distribution Transformers

C57.13-1993 IEEE Standard Requirements for Instrument Transformers {Note: The PAR for PC57.13 is due to expire in December 2002.}

C57.19.00-1991 (R1997) IEEE Standard general Requirements and Test Procedure for Outdoor Power Apparatus Bushings {Note: The PAR for PC57.19.00 is due to expire in December 2002}

C57.19.03-1996 IEEE Standard Requirements, Terminology, and Test Code for Bushings for DC Applications

C57.19.100-1995 IEEE Guide for Application of Power Apparatus Bushings

C57.21-1990 (R1995) IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA

C57.91-1995 IEEE Guide for Loading Mineral-Oil-Immersed Transformers {Note: The PAR for PC57.91-1995/Cor 1 may be affected}

C57.104-1991 IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers {Note: The PAR for PC57.104 is due to expire in December 2002}

C57.111-1989 (R1995) IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers

C57.113-1991 IEEE Guide for Partial Discharge Measurement in Liquid-Filled Power Transformers and

Shunt Reactors {Note: The PAR for PC57.113 is due to expire in December 2002.

C57.124-1991 (R1996) IEEE Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry Type Transformers

C57.131-1995 IEEE Standard Requirements for Load Tap Changers

7.0 Results of C57 Collection Survey – Greg Anderson, Tom Prevost

7.1 Survey Results

A survey related to continuing need for the C57 Collections was completed prior to the Meeting. There were 205 responses. Greg reviewed his summary report of the survey, with results as follows:

Q1 - In what primary format do you currently review the C57 Standards?

- A. Individual Standards (small separate booklets) -- 42
- B. C57 Collection (the "softback phonebook") -- 137
- C. On-line Standards -- 25

Q2 - If updated in the next 2-3 years, do you plan to purchase a C57 Collection? (anticipated price \$300-\$500)

- A. Yes -- 165
- B. No -- 40

Q3 - If IEEE continues to periodically publish the C57 Collection (the C57 Standards assembled in one publication), what would be your preferred format?

- A. Softback (phonebook) -- 86
- B. Compact Disk (CD) -- 92
- C. Neither, I prefer to get my standards on-line -- 27

Q4 - Why is this your preferred format?

Note: Most of the respondents replied that "convenience" and/or "cost" was why they preferred the phonebook or the CD format. It is worthwhile to view these responses in the complete survey.

Q5 - If your company plans to purchase several copies at one time, how many copies do you expect your company to purchase?

- A. Unsure -- 49
- B. 1-5 -- 133
- C. 6-10 -- 7
- D. >10 -- 5

Note: We predicted this question would difficult to respond to as individuals (perhaps it was worded incorrectly), and therefore it would be difficult to analyze the responses. But, it is interesting to see how each individual responded and what company they worked for.

Commentary: Some of the more popular comments were:

"Convenience to use the phonebook or a CD" -- 106

"The cost of Standards On-line is too high" -- 35

"Comments about difficulty to access Standards On-line due to availability or speed" -- 22

7.2 Letter Requesting PES Support

Tom Prevost sent the following letter on Committee letterhead to Jim Harlow, requesting that he present our position on the continuing need for the C57 Collection, and solicit PES support.

Mr. Jim Harlow

Dear Jim,

January 3, 2002

As Vice President, Power Engineering Society Technical Activities Committee and a past chairman of the PES Transformers Committee we would like to make you aware of a serious concern that the PES Transformers Committee membership has in regard to the availability of a C57 standards collection.

As you know we are a volunteer organization. We voluntarily spend our personal time and the resources of our companies to support the maintenance and development of standards in our industry. Why do we do it? We do it, and are supported by our companies to do it, so that the standards that we use on a daily basis are state of the art and reflect the current business activities and make our jobs easier by creating standards for our industry. That being said, the Transformers Committee, which has a membership of over 500 engineers, as well as anyone else interested, has in the past been able to purchase a C57 collection of transformer related standards. This collection was published on a two to three year cycle so that most consumers interested in keeping current standards purchased a collection every two to three years.

Our last C57 collection (hardcopy) was published in 1998. This same version has recently been reprinted and contains none of the recent revisions; superceded standards remain and new/revised standards are not included. We find the recent re-printing unsuitable for the needs of the industry. The only up-to-date C57 collection is the on-line version.

During our recent Transformers Committee meeting, which was held the week of October 14th, 2001 we surveyed the Standards Subcommittee meeting. The consensus at the meeting was that there should be a choice. We would like a C57 collection to be published as a hardcopy or CD-ROM and that it be updated at least every two years. For those individuals or groups who would like on-line access to standards a C57 collection alternative should be available as well. We believe that this will maximize the potential for the sales of standards, which generates the income to keep IEEE in business, as well as to provide IEEE customers a choice for the purchase of standards. It will also avoid the confusion that is sure to be caused in the industry by re-printing without updating. As far as the cost of these options is concerned the group suggested that the cost should be about the same regardless of which choice the customer should make.

We are sure that the other PES committees which have a collection of standards have the same concerns as the PES Transformers Committee. We would appreciate it if you could take this message to the executive level at PES so that we can make the issue of standards availability a PES issue.

Sincerely,

Tom Prevost
Standards Coordinator

7.0 C57 Collection Survey (cont'd)

PES Transformers Committee

8.0 Recognition and awards – B. K. Patel

8.1 Certificates of Appreciation

Certificates of Appreciation have been obtained for the following persons:

<u>Name</u>	<u>Service Rendered</u>
Mike Y. Lau	Host, Vancouver, Canada, April 2002
Pritpal Singh	Technical Committee WG Position Paper Prize Award Chair, C57.19.01-2000, Performance Characteristics for Outdoor Bushings Working Group
Pritpal Singh	Technical Committee Working Group Recognition Award Chair, C57.19.01-2000, Performance Characteristics for Outdoor Bushings Working Group
WG Members	Technical Committee Working Group Recognition Award* C57.19.01-2000, Performance Characteristics for Outdoor Bushings Working Group

* WG members are: Altman, Bello, Bertolotto, Blackburn, Caruso, Costa, dela Cruz, Elliott, Ellis, Fox, Frost, Hansen, Hartgrove, Heyman, Huff, Ko, Laird, Long, Nordman, Patton, Platts, Rajadhyaksha, Rivers, Ruevekomp, Sharma, Stiegemeier, Thompson, Tuli, Wagenaar, Wolfe, Young, Zeng, & Zhao.

Supplemental Note to Report: Prit Singh graciously expressed his appreciation for these awards on behalf of all the WG members, and his thanks for the effort and dedication of those members. Prit particularly noted Loren Wagenaar's contribution as the primary author of the awarded paper.

The following awards will also be presented at the main committee meeting:

Bertrand Poulin Chair, Dielectric Tests Working Group for Revisions of Transient Tests.
(This was announced at the last meeting.) Note Bertrand

Phil Hopkinson Fellow Award

Supplemental Note to Report, due to the significant nature of the Fellow Award: The citation reads "The Institute of Electrical and Electronics Engineers, Inc., certifies that Philip John Hopkinson, has been elevated to the grade of Fellow for contributions to the reliability of distribution transformers, and the development of related standards for testing and applications." Phil acknowledged the contributions and support of the many "mentors" who have helped him over the years, and particularly acknowledged one of his first mentors, Chuck McMillen. (Sadly, we note that since this Meeting Chuck McMillen has passed away.)

8.2 Nominations for IEEE, PES, and Technical Council Awards

I propose the following award nominations:

Transformers Committee for Technical Council Technical Committee Distinguished Service Award

HVDC Converter Transformers and Smoothing Reactors Subcommittee – Working Group on General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission (IEEE 1277-2000) for Technical Committee Working Group Standard Award

Note that IEEE 1277-2000 was nominated for Working Group Award last year and was not successful. This is a renomination.

8.3 Technical Committee Distinguished Service Award

The following is a slightly edited description of the new award established at last meeting. Since there will be only one general IEEE meeting from next year the previous description needs a revision:

Each Technical Committee is encouraged to make one annual award for outstanding service. This personal recognition acknowledges the efforts of those individuals whose sustained performance, over many years, has contributed to the advancement of the committee technology. This award consists of a plaque with a suitable inscription.

I propose that the name of the Outstanding Service Award recipient must be submitted to the Technical Council Awards Committee Chair by **April 1 of each year**. The award will be available and distributed to our representative at the Technical Council Meeting during the following General Meeting. It would be available for presentation to the individual at our **Fall Committee Meeting**.

This award will be presented to outgoing Committee Chairs. Every other year, where there is no outgoing Committee Chair, it is presented to another deserving individual.

The Administrative Subcommittee will make the selection of the deserving individual. The “Procedure for Selection of Individuals Who Have Performed Outstanding Service for Recognition by the Committees of the Technical Council” is shown below:

**PROCEDURE FOR SELECTION OF INDIVIDUALS WHO HAVE
PERFORMED OUTSTANDING SERVICE FOR RECOGNITION
BY THE COMMITTEES OF THE TECHNICAL COUNCIL**

To recognize individual achievement, distinction must be drawn between the contribution of the individual and the papers individuals have written. Specific technical high points are recognized by separate procedures. Personal recognition acknowledges the efforts of those individuals whose sustained performance over many years has contributed to the advancement of committee technology. The Technical Committee may select annually an individual to be recognized.

Procedure:

The individual to be recognized is to be selected by a Recognition Working Group. The Working Group should be chaired by a member of the designated responsible committee or subcommittee appointed by the chair of that committee or subcommittee and shall consist of one member from each of the major subcommittees of the Technical Committee. It is preferable that these members be past chairs of their respective subcommittees or alternatively have been a member of their respective subcommittees for at least five years.

The Working Group shall be appointed at the fall or winter meeting of the Technical Committee. They shall make their determination and present the report by the following spring or summer meeting so that the individual who is to be recognized may be honored at a luncheon or dinner meeting at the succeeding winter or spring meeting of the Technical Committee.

The recognized individual and any of the other candidates may be suggested by this committee for nominations to one of the Institute awards. The credentials of the individual shall be gathered on a suitable form.

The Technical Committee shall forward the name of the individual to be recognized to the T.C. Award Chair by November 1 of each year.

Award:

The award is to consist of a medallion mounted plaque with an inscription in recognition of distinguished service to the Technical Committee. This award will be as prescribed by the Technical Council.

Selection:

In the selection of the individual, the integrated contribution must be considered. For example:

Committee and/or subcommittee chairing. Working Group activities and general participation in Technical Committee affairs.

Continued and sustained publication of worthwhile technical papers.

Significant contribution as a spokesman for the industry to the world at large. (This might be testimony before government bodies or acting as spokesman to the general public and interface problems within the industry).

Sustained leadership in getting technology into fields of interest previously not adequately covered.

A combination of the above which sets the individual apart as one who is a mover in our field.

Nominations for these awards must be submitted as shown on the attached chart of the PES and IEEE awards available to PES Technical Committees.

B.K.Patel, Chair

Awards Subcommittee

PES TECHNICAL COMMITTEE AWARDS

AWARD	NOMINATION DEADLINE	NOMINATION SENT TO:
I. PES Prize Paper Award	October 25	Ed Guro
II. (a) PES Working Group Award - <i>Technical Report</i> (b) PES Working Group Award - <i>Standard or Guide</i>	October 25 October 25	Ed Guro
III. "High Interest" Paper to be published in <i>PES Review</i>	October 25	Noel Schulz
IV. Alfred Noble Intersociety Award	October 25	Noel Schulz
V. Technical Committee Prize Paper Award	November 1	Noel Schulz
VI. Technical Committee Distinguished Service Award	November 1	Noel Schulz
VII. Technical Committee Working Group Recognition Award	November 1	Noel Schulz
VIII. IEEE Prize Paper Awards - (a) W. R. G. Baker (b) Donald G. Fink (C) Browder J. Thompson	April 1	Ed Guro

PES Awards Committee Chair	Technical Council Awards Chair
Ed Guro PPL Electric Utilities Two North Ninth St., Genn4 Allentown, PA 18101 Phone: (610) 774-4550 Fax: (610) 774-4116 Email: eaguro@pplweb.com	Dr. Noel Schulz Mississippi State University 216 Simrall Eng. Bldg., P. O. Box 9571 Mississippi State, MS 39762 Phone: (662) 325-2020 Fax: (662) 325-2298 Email: schulz@ece.msstate.edu

9.0 Meetings Planning Subcommittee -- G. W. Anderson

The Meetings Planning Subcommittee (Mtgs SC) holds an open meeting at each TC meeting to plan future meetings and to assist future hosts by education, mixing of ideas, and lessons-learned. The meeting is attended by at least 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 meeting began at 3:00 p.m., Wednesday, April 17, 2002 in the Westin Bayshore Resort & Marina in Vancouver, BC, Canada. Twenty-two (22) people were in attendance. Greg Anderson, SC Chair facilitated. The meeting began with introductions by the attendees.

9.1 Committee Finances

Committee funds are presently (as of March 12, 2002) \$8,114,99.

9.2 Past & Present Meetings

9.2.1 Past Meeting - Orlando, Florida, USA

Joe Watson of Florida Power & Light and Jim Huddock of Grand Eagle/Ohio Transformers did an excellent job of planning and implementing the previous meeting. The attendance was good (289 attendees and 69 companions/spouses) despite the tragic events of September 11th, just five weeks earlier. The facilities of the Rosen Centre were excellent. Due to the location of the meeting, this meeting was promoted as a family event and 14 of the attendee's children joined us at the Sunday Evening Reception. A couple of balloon-blowing clowns entertained the children. Due to the many fixed expenses and the less-than-expected attendance (we originally expected over 400 attendees and 100 companions), a close vigilance to the food & beverage expenses and audio/visual services was necessary. Joe was commended also for his hard work in reducing the expenses of the meeting especially by providing all the overhead projectors and screens for the event (a huge physical effort).

Grand Eagle hosted a nice luncheon and tour of their Bradenton repair facility on Sunday morning. About forty people attended an "early-bird" golf tournament at Lake Buena Vista on Saturday afternoon hosted by Roberts Transformers. Mr. Joe Delai, a mechanical engineer at NASA Kennedy Space Center, presented an enjoyable overview of the International Space Station during the Tuesday Luncheon (149 attended). The Wednesday Evening Dinner Social was held at the nearby "Titanic, Ship of Dreams" museum (222 attended).

We uniquely provided four Companion Tours at this meeting (two on Monday and two on Tuesday). Half of the tours were promoted as "kid friendly". The Tours consisted of: Disney's Town of Celebration (18 attended), SeaWorld Behind the Scenes (28 attended, including 4 children), Kennedy Space Center (28 attended, including 4 children), and Historic Winter Park & Shopping (24 attended).

FYI: Of the 289 attendees, 251 (86%) pre-registered using the on-line registration system! Of those 251 who pre-registered, 224 (77%) did so before September 14th and received a \$20 early registration discount AND the free logo golf-shirt.

9.2.2 Present Meeting - Vancouver, B.C., Canada

Mike Lau gave a brief report of the on-going meeting. Attendance was good (280 attendees and 81 companions) at this meeting despite continued caution due to the depressed economy and past events of September 11th. Mike and his wife Nancy and the entire team at BC Hydro did an excellent job of planning and implementing the meeting. The facilities at the Westin Bayshore Hotel were fantastic, especially with the proximity to downtown and the adjacent Stanley Park.

The Saturday all-day early-bird tour of Vancouver Island and Victoria was well-attended (68 attendees). Additionally, 86 people registered for the Sunday morning tour of Powertech Laboratories (although only 55 actually attended) and 27 registered for the Thursday afternoon tour of Powertech (although only 16 attended). Also 56 people registered for the Monday evening tour of the NxtPhase factory (although only 45 actually attended). Greg firmly criticized that, even though there was no charge for the event, it was irresponsible for people to register and not show-up. On Sunday for instance, Powertech had chartered two buses (each with 56 seats) when only one bus was actually necessary. Also, the restaurant had staffed-up and prepared lunch for 86 people and only 55 actually showed-up.

Mr. Ron Threlkeld, Senior VP from BC Hydro gave an interesting presentation on "Dealing with Aging Assets, Human & Infrastructure" during the Tuesday Luncheon (161 attended). On Wednesday evening, 225 people attended the dinner social at the Vancouver Aquarium. On Monday, 60 companions enjoyed a tour of the City of Vancouver, Chinatown and Stanley Park, and a visit to the UBC Museum of Anthropology. On Tuesday, 61 companions enjoyed a tour of the North Shore, the Capilano Suspension Bridge, the Salmon Hatchery, and Grouse Mountain.

FYI: All but nine attendees (97%) pre-registered for the Vancouver meeting. This excellent advance response tremendously helps in planning the meeting.

9.3 Future Meetings

9.3.1 Summary

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

October 20-24, 2002 -- Oklahoma City, Oklahoma, USA, at the Renaissance Hotel, hosted by Joe Garza (Southwest Electric).

March 16-20, 2003 -- Raleigh, North Carolina, USA, at the Sheraton Capital Center, hosted by ABB.

Fall 2003 (exact date to be determined) -- Pittsburgh, Pennsylvania, hosted by Dennis Blake (Pennsylvania Transformers Technologies).

Spring 2004 -- open for meeting in the US.

Possible locations for future meetings include: Jackson, Mississippi; California (perhaps near San Jose); New York or New Jersey (near IEEE HQ); Minneapolis; Denver; Branson, Missouri; Montreal; and Edinburgh, Scotland to name a few.

Greg apologized that this meeting in Vancouver was adjacent to the Doble Conference, held during the previous week. Hopefully by using the "Industry Calendar" (available for viewing on the TC web-site) and coordinating with related organizations, conflicts with such meeting will be minimized.

9.3.2 Upcoming Fall 2002 Meeting (October 20-24) -- Oklahoma City, Oklahoma, USA

Joe Garza was not able to make the Vancouver Meeting due to an illness. Bruce Forsythe from Southwest Electric made a brief report on the progress of the planning for the event. A very nice tri-fold full-color brochure promoting the next meeting was disseminated at the Vancouver meeting.

Guest rooms have been reserved at the downtown Renaissance Oklahoma City Hotel. Meeting rooms have been reserved at the Cox Business Services Convention Center adjacent to the Renaissance Hotel and connected by an enclosed skywalk. The room rate at the Renaissance will be US\$130/night (without taxes), single or double occupancy. A few king suites are available for US\$156/night. The hotel is now taking reservations at (800) HOTELS-1 or (405) 228-8005. Attendees should mention the "IEEE Transformers Committee" to receive the reduced group rate (reduced rate available until Monday, September 22, 2002).

The Wednesday Evening Dinner Social, called "Stetsons at Sunset", will be held at the Cowboy & Western Heritage Museum. A sit-down barbeque dinner will be served with western dancing afterwards (a dance instructor will be available). Western attire (hats, boots, jeans, prairie or broom shirts) will be appropriate dress for this event. There will also be a tour of Southwest Electric's redesign & re-manufacture facility on Sunday morning.

Joe Garza can be reached at (713) 849-9197 or jgarza9197@aol.com (IEEE alias e-mail address pending). Joe has acquired the assistance of Ms. Jennifer Anderson from ASE Productions, Inc. in planning this event. Jennifer is a good source of travel and local information and she can be reached at (405) 843-3020 or janderson@aseproductionsinc.com.

9.3.3 Upcoming Spring 2003 Meeting (March 16-20) -- Raleigh, North Carolina, USA

ABB will host the Spring Meeting in Raleigh, North Carolina. The meeting host (the individual person) has not yet been identified. The meeting will be held at the Sheraton Capital Center. Room rates are \$124/night (without taxes), single or double occupancy. Technical tours are being planned for ABB's South Boston, Virginia plant, Waukesha Electric System's Goldsboro, North Carolina plant, and perhaps Siemen's medium-voltage switchgear plant in Raleigh. It is likely that this meeting will have a "switchgear focus" with possible interactions with the PES Switchgear Committee and a couple of tutorials/presentations on the subject.

9.4 Working Group Report

9.4.1 WG on Web-Site Development - Submitted by Susan McNelly

The meeting for the Working Group on Web-site Development was held at 1:30 pm on Wednesday, April 17, 2002. There were 18 people present (14 identified themselves as SC, WG or TF representatives, 3 guests, 1 IEEE representative). It was noted that three of the fifteen subcommittees did not have a representative at the past WG meeting in Orlando.

The agenda for the meeting was as follows:

1. Introductions
2. Membership
3. Working Group Scope
4. Procedures and Policies
5. Latest Changes to Web-Site Structure & Subcommittee Web-pages
6. Future of Web-site.
7. Adjourn

During introductions, Susan McNelly (the WG Co-Chair and present Co-Webmaster) indicated that Georges Vaillancourt (the other Co-Chair and Co-Webmaster) has indicated a desire to retire within the next one to two years and Sue will soon be the primary Webmaster with Georges assisting. A suggestion was raised that when Georges does fully retire, a backup Webmaster should be located so that there is always someone available that knows how the web-site works and can access it.

A proposed Purpose and Policy for the e-mail reflector service was presented. It was noted that the reflector service would be revised to a "monitored service" that will require all e-mails to be first sent to a designated monitor (probably Greg Anderson) before dissemination. This monitoring of submitted e-mails will in effect "police" the use of the service. The only comment received on this was that there should be some policy regarding response of the monitoring procedure; i.e. 48 hour turn-around, etc. It was also noted that if you "reply to all" to a reflector e-mail, that this would also go through the monitor before being disseminated.

The following is the proposed policy for the e-mail reflector service:

Purpose of E-Mail Reflector Service: This service allows for sending e-mail messages to anyone subscribing to the service. The e-mails are sent only to individuals who voluntarily subscribe to the service. Only information related to the Committee is disseminated using this service.

Policy: The E-mail Reflector Service shall not be used to disseminate commercial information or for personal use. The Reflector shall not be used to advertise goods or services or for locating equipment due to equipment failures. Any individual or company using the Reflector Service for commercial purposes, or for purposes not related to the work of the Committee, will be banned from further use of the service. To manage the use and integrity of the service, submitted e-mails will be previewed by a designated monitor prior to being released. The success of the service depends on the attitude and use of its subscribers. Users should use discretion when using this service.

Jin Sim indicated that a section regarding the web-site needed to be added to the Committee's Organization and Procedures Manual. A draft will be developed for review and possible addition. Areas such as site security will need further discussion before policies can be completed.

There was discussion of the individual web-pages within the web-site. The following were identified as recommendations regarding posting of minutes and for page content updating:

Recommendation for Posting of SC and WG minutes: SC chair to send minutes for their SC, WG, and TF committees to the Transformer Committee Secretary. He will then forward the minutes as he receives them to the Webmaster. This allows for a single point of contact regarding minutes.

SC, WG, and TF Web pages: Chairs of each of these groups need to take *ownership* of their pages. Updates and postings should be directed to the Webmaster with instruction on what they would like to have done.

On the subject of site security, the following topics were discussed:

File Security for limited access: IEEE has indicated that we can set up separate security access for drafts of standards, roster lists, and other such documents that cannot be made available in general on the Internet. This is the next step that we need to achieve to get increased use of the web site.

E-mail addresses: For the near-term, at a minimum, all hyperlinks to e-mail addresses on the web-site will be removed in an effort to reduce the likelihood of search engines picking up on the links and abusing them.

Further review, possibly by a WG task force on web-security, will be needed to determine the extent of accessibility of information on the web site; i.e. how much content should be available to the general public and how much to the Committee, subcommittees, etc. Greg Anderson suggested that a company volunteer to sponsor an IT security guru to attend an upcoming meeting to educate us on the basics of web-page security.

Presently, IEEE provides the Committee with web-hosting services at no charge. It was suggested that, depending on the capabilities of IEEE to meet the needs of the Committee, it maybe necessary at some point to move the web-site to another web-host (perhaps a for-fee site) to be able to provide additional security functions. Sue McNelly will investigate the options available on the IEEE grouper site with IEEE.

Also, there was considerable concern among members about what extent personal contact information, etc. should be available on the web site, even to the extent of leaders of the Committee, including SC or WG chairs. As mentioned, the whole issue of site security policies will need to be further developed at upcoming meetings.

In closing, the question of what can we do with this WG meeting to make it more productive and useful to the members. While the overview of the web-site was nice for people who had not spent much time negotiating it, a review of the site should not be necessary at every meeting other than to possibly

identify new changes. Again, the main concern about the site security was raised, so the next meeting or meetings should be focused on how to work out this issue.

At the next meeting in Oklahoma City, this WG will meet during the Wednesday morning breakfast time-slot to avoid conflicts with SC meeting sessions.

9.5 New Business

9.5.1 Web-site

Appreciation was given to Georges Vaillancourt and Susan McNelly for their work on the web-site. Discussion of the web-site continued in the SC meeting with further concerns of web security. Greg again suggested that someone (a participating company) perhaps sponsor an IT security guru to attend an upcoming meeting to educate us on the basics of web-page security.

Several individuals noted that they could view the e-mail addresses contained in the e-mail reflector service within a disseminated reflector e-mail message. This is being confirmed and addressed. The e-mail reflector service will be disabled until the present service can be changed to a monitored service.

9.5.2 Educational Development

Three tutorials/presentations were presented at this Vancouver Meeting and they continue to "exceed all expectations". Twelve individuals applied for accredited continuing education units (CEUs) at the Vancouver Meeting. Material from each of the presentations is now available on the Committee's web-site.

The following is a summary of the attendance at the presentations:

"Panel Discussion on LTC Diagnostics" (two part session), by Dave Hanson, Fredi Jakob, Hans Schellhase, Dieter Dohnal (facilitated by Jim Harlow) - 130 attendees

"Different Aspects of Frequency Response Analysis (FRA), by Larry Coffeen, Charles Sweetser (facilitated by Ramsis Girgis - 130 attendees

"50 Hz to 60 Hz Conversion Factors for Transformer Performance Parameters, by Ramsis Girgis and Ed teNyenhuis - 75 attendees

Future candidate presentations include: Net Meetings (On-line Meetings and Remote Conferencing), Switching Transients (a summary of work by Bob Degeneff's WG), Web-based Review of PES Technical Papers, Loss Tolerance & Measurement (by Ramsis Girgis), and National Energy Policy (by Phil Hopkinson).

Greg suggested that one WG or TF schedule an Internet conference before the next meeting and report back the results (how it went, etc) to the Committee at the Fall 2002 Meeting in the form of a presentation on Monday or Tuesday afternoon. Tom Prevost will consider a WG or TF project that would be a candidate to hold a mid-meeting on-line conference.

Greg also suggested that most people do not need accredited CEUs for maintaining professional licenses, but rather unaccredited professional development hours (PDHs). CEUs are difficult to accredit and process. Unless an attendee determines that CEUs are necessary for maintaining their license, and notifies Greg, accredited CEUs will not be offered at future meetings. PDHs will be available at future meetings in the form of a certificate of attendance signed by the instructor(s). The certificates will be distributed at the end of each tutorial/presentation. Additionally, a "WG for Educational Development" is being considered to promote educational content and coordinate presentations and tutorials.

Greg is still looking for someone to assist him with planning and administrating the presentations.

9.5.3 Coffee Break Sponsors

On Sunday afternoon, the Administrative Subcommittee approved coffee break sponsors (or "patrons") for the Oklahoma City Meeting and subsequent meetings. The purpose of coffee break sponsorships are to subsidize rising meeting costs and: (1) Maintain a low meeting registration fee, (2) Provide vendor-based, technical-focused material, (3) Foster relationships between meeting attendees and manufacturers, consultants and others. Policies and procedures for sponsorships will be available on the Committee's web-site soon. Joe Watson offered to administrate the process and coordinate sponsors (thanks Joe!). Contact Joe to apply for future sponsor opportunities.

9.5.4 Schedule Changes - New Lunch & Breakfast Meetings

Greg proposed moving several individual meetings to a different timeslot at the Oklahoma City Meeting to avoid conflicts with other meetings. The "Newcomers Orientation" (typically facilitated by the Committee Vice Chair) will be moved to the Monday breakfast timeslot. The "Standards Development Process Review" (facilitated by the Standards Coordinator) will be moved to the Monday luncheon timeslot. Attendees at this meeting will be able to register for this lunch with the on-line meeting registration system. Finally, the "WG for Web-site Development" will be moved to the Wednesday breakfast timeslot.

9.5.5 Committee Historians

Greg suggested that the Committee document and archive the history of the Committee; i.e. old meeting minutes, old photos, etc. It is proposed that a group of "historians" (or "old timers") meet briefly during the next meeting in Oklahoma City and develop a plan to gather old meeting information for permanent archiving. We are still investigating creating an "anniversary CD" that will contain an assembly of documents and meeting minutes from the past 5-10 years. The CD could perhaps be presented as a gift to all Committee Members and made available to meeting guests and other interested individuals.

9.5.6 Miscellaneous

Additional topics were discussed:

Greg is still investigating a way of coordinating and consolidating our membership databases and is looking at several outside companies that provide such services, including integrated on-line meeting registration systems. We presently maintain and use no less than five non-relational databases: the TC "mailing list" maintained by SC Secretary, the attendee list for each TC meeting, the standards ballot lists, and individual membership lists maintained by SC & WG chairs. It would be helpful if databases used by the Committee were relational, centrally-located, and the contact information was self-maintained by the members. Greg plans to make a presentation at the next meeting of a proposed system.

Greg again encouraged everyone to create their own "IEEE e-mail alias address" - an excellent service provided free of charge by IEEE. An alias is a permanent e-mail address that remains the same, even if the user moves to a different company or ISP. For instance, Greg uses "gwanderson@ieee.org" and has used that same address for years, even though he has changed employers twice. A message sent to an individual's alias is immediately re-directed to an e-mail address chosen by the individual. For instance, an e-mail sent to Greg's alias is immediately forwarded to his HDR address. The alias service also provides excellent virus filtering, and often, a person can create a much simpler (shorter) e-mail address than the one provided by their employer. An alias also identifies a person as an IEEE member. A link to the IEEE e-mail alias service is provided within the Committee's web-site.

The meeting was adjourned.

Respectfully Submitted, Greg Anderson, SC Chair

10.0 Reports of Technical Subcommittees

The following reports are those of the technical subcommittees of the Transformers Committee. In most cases they are the complete minutes of meetings held earlier in the week of the Main Committee Meeting.

Secretary's Note: The subcommittee reports have been edited for consistency in format. No changes have been made to the content of these reports except for typographical errors and obvious improvements (removal of attendance lists and some general items, typically items from the Administrative Subcommittee Meeting, covered elsewhere). Complete (unedited) Subcommittee meeting minutes are individually posted on the Committee website (<http://www.transformerscommittee.org/>).

10.1 Dry Type Transformers SC – W. F. Patterson, Jr., Chair (Presented by C. W. Johnson, Jr.)

10.1.1 Chair Remarks and Announcements

The Dry Type Transformer Subcommittee met at 9:35 AM on April 17, 2002 with 12 members and 9 guests present; 6 guests requested membership. Secretary Charles Johnson chaired the meeting. Introductions were made and the attendance roster was circulated. Minutes from the October 17, 2001 meeting were reviewed and approved. Announcements were held until after the working group reports were given.

10.1.1.1 Working Group Reports

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

10.1.2.1 WG Dry Type Smoothing Reactors IEEE 1277	R. Dudley
10.1.2.2 WG Dry Type Thermal Evaluation C57.12.56/C57.12.60	J. Puri
10.1.2.3 WG Dry Type General Requirements C57.12.01	A. Jonnatti
10.1.2.4 WG Dry Type Test Code C57.12.91	D. Barnard

10.1.1.2 Announcements and New Business

Paulette Payne presented a report on the status of the reaffirmation of standards C57.12.124 and C57.12.58:

C57.12.58

Eligible Balloters: 47

C57.124

Eligible Balloters: 58

Ballots returned: 41 (87%)
Affirmatives: 40 (97%)
Negatives: 1
Abstentions: 0 (0%)

Ballots returned: 50 (86%)
Affirmatives: 48 (97%)
Negatives: 1
Abstentions: 2 (2%)

The negative balloters agreed to change their vote to affirmative on the basis that their comments would be considered in a revision subsequent to the reaffirmation. Both documents have been submitted to REVCOM for their June 12, 2002 meeting. Don Kline agreed to review C57.124 regarding the comments of the negative ballot and report to the subcommittee at the next meeting. Jeewan Puri agreed to review C57.12.58 regarding the comments of the negative ballot and report to the subcommittee at the next meeting

William Simpson reported on the status of IEC TC 98.

Secretary Johnson discussed issues from the Administrative Subcommittee meeting. The details of that meeting can be found in the main committee minutes.

Subcommittee members were reminded to return ballots in a timely manner.

The location and dates for upcoming meetings were discussed.

Being no further new business, the meeting was adjourned at 10:34 AM.

10.1.2 Working Group Reports

10.1.2.1 Working Group on Dry Type Reactors - Chair: Richard Dudley

The Dry Type Reactor W.G. met in the Cypress 2 Meeting Room of the Westin Bayshore Inn in Vancouver, B.C. on April 15, 2002 from 9:30 a.m. to 12:15 p.m. There were 7 members and 3 guests present. The following are the highlights of the meeting.

1. The minutes of the Orlando meeting were approved.
2. Peter Balma presented a summary of the ballot results re the reaffirmation of C57.21. Highlights were:
 - (i) 78 ballots were sent out, 60 were returned and of these 5 were negative.
 - (ii) A large number of editorial comments were received. Many were probably the result of the conversion of C57.21 to electronic format.
 - (iii) One negative ballot was based on the fact that the switching impulse for dry type reactors is set at 83% of the lightning impulse as is the case for oil immersed reactors. The negative ballotor felt that it should be 70-75%. The consensus of the W.G. is that the switching impulse level is related to LA protection characteristics / practice; typically

the switching protective characteristic of an LA is 85% of the lightning (BIL) protective characteristic. In other words the switching impulse level of a shunt reactor as a percent of the lightning impulse (BIL) is not a function of the shunt reactor construction (dry type vs oil immersed) but is equipment type independent and is a function of LA protective characteristics. Therefore the W.G. rejected the basis of this particular negative ballot and the switching impulse levels for dry type shunt reactors as presented in C57.21 are valid.

- (iv) The W.G. felt that the best approach to deal with the negative ballots would be to propose that the negative ballots be withdrawn based on a commitment to raise a PAR to revise C57.21 based on the comments received with the ballots and the life of C57.21 be extended at least 2 years. The revision of C57.21 would also include the 2 annexes currently under preparation by the W.G; thyristor controlled reactors and switching stresses.

3. Draft #3 of Annex A (TCRs) was discussed. The following are the highlights.

- (i) Pierre Riffon's comments were discussed. His editorial and technical comments were accepted with only some minor modifications. The major change was to the note in Clause A5.4.4 "..... The turn to turn test is the dielectric test that is normally performed to verify the winding insulation system. If a lightning impulse test is required it shall be specified at time of order by the purchaser".
- (ii) A clause describing test configuration will be added to A5.

5.1 General

All routine tests may be carried out on a per coil basis. Type tests for 2 coil stacked TCRs should be carried out in a two coil configuration, if applicable.

Once the above changes are made to Annex A, draft #4 will be balloted to the W.G.

4. Draft #2 of Annex B on shunt reactor switching and imposed dielectric stresses was discussed. The following are the highlights.

- (i) Pierre Riffon's editorial and technical comments were reviewed and accepted with only some slight modifications / clarifications.
- (ii) The comments of Lars Erik Juhlin were discussed and it was agreed to remove the table describing typical worst case dielectric stresses on shunt reactors during re-ignitions as it may present a misleading or incomplete picture. Another alternative discussed was to leave the table in the annex and retitle it as examples of re-ignition stresses.

Definitions of tertiary and direct connect shunt reactors will be included in B.1.

The table of chopping numbers in B.3.1 will be modified to reflect that typical values of chopping numbers for vacuum circuit breakers are not available.

The last paragraph in B.3.1 will be modified: "In the case of high voltage ≤ 345 kV)....."

The sequence of the second to last and last paragraphs in B.3.1 will be reversed.

- (iii) "B5.0 Mitigation" was discussed. Additional sentences will be added to the second paragraph.

....."Additional transient recovery control networks such as shunt RC devices may be employed. It is highly recommended that detailed overvoltage calculations be performed for each shunt reactor application and appropriate measures taken to ensure that dielectric stresses seen by the shunt reactor(s) and associated equipment are kept within acceptable limits".

- (iv) What are the correct units to be used for the chopping numbers listed in B.3.1? IEC 1233 and IEEE C37.015 will be consulted.

- (v) The comments of C. Piexoto were discussed. His assertion that the switching impulse level of dry type shunt reactors should be lower than 83% of the BIL was rejected by the W.G. The rationale is that the typical protective level of LA's for switching surges is on the order of 84% - 85% of the BIL protective level. Since oil and dry type SRs are used inter-changeably and under the same LA protection practice it is appropriate that dry type shunt reactors should have a switching impulse withstand capability of 83% of the lightning impulse (BIL) as is the case for oil immersed SRs.

The Chairman stated that he would prepare new drafts of Annex A and Annex B based on the above. He also requested any additional comments from W.G. members be forwarded to him as soon as possible so they could be included. The meeting adjourned at 12:15 p.m.

10.1.2.2 WG Dry Type Thermal Evaluation C57.12.56/C57.12.60 - Chair: Richard Provost

The meeting of C57.12.56/ C57.12.60 was held on Tuesday April 16th at 8:00 am in Salon room 1 of the Westin Bayshore Resort and Marina Hotel in Vancouver, B.C. Canada

Chair Provost was unable to attend and Jeewan Puri chaired the meeting.

The consensus of the working group was to merge the existing documents into one document.

Feedback was requested on C57.12.60. Users of the document were ask to collect data on the test procedures and supply to Chair Provost.

David Barnard and William Simpson agreed to review the existing test procedures.

The working group plan is to review model concepts in the test sections of the present documents. Chuck Johnson and Rick Marek agreed to review the existing models and report to the working group.

The meeting adjourned at 9:15.

10.1.2.3 Working Group on Dry-Type General Requirements – C57.12.01 - Chair: John Sullivan, Secretary: Anthony Jonnatti

The meeting of C57.12.01 was held on Tuesday April 16th at 9:30 am in Salon room 1 of the Westin Bayshore Resort and Marina Hotel in Vancouver, B.C. Canada

After the introduction of the members and guests present , the minutes of the Orlando, Florida meeting were approved. Twelve members and eight guests were present. Three guests requested membership. Hassan Zarmandily, Don MacMillan and Larry Davis.

Tony Jonnatti was representing the Chairman, John Sullivan, who was unable to attend.

The first order of business was the status of the balloting of the revised standard C57.12.01. Sixty Two (62) were received. Fifty Nine (59) were received approved, two(2) were received with negative comments and one(1) was received with an abstention.

The next order of business was a review of comments received. A number of editorial comments were submitted and presented to the working group. All of the

Editorial were addressed and any necessary corrective action will be made.

Three comments on phasor diagrams in the standard were submitted. It was agreed that all of the phasor diagrams will be reviewed and improved as much as possible.

A comment was received on the BIL requirements for winding voltage of 120 and 250 volts. An attempt will be made to clarify the wording in this section.

A comment was received to include a reference to 50 hertz in the standard. The working group agreed to leave the wording in the standard unchanged.

A comment was received on enclosure coatings. The working group believed that the wording in the standard was sufficient.

After the discussion on the balloting comments were concluded the working group was advised to consider future items to be addressed in the next revision of this standard. Consideration should be given the addition and items that may be improved or removed.

There was no old business and no new business to be discussed.

The meeting was adjourned at 10:45 am.

10.1.2.4 Working Group on Dry-Type Test Code - C57.12.91 - Chair: Mr. Dave Barnard, Secretary: Mr. Tim Lewis

The working group met at the appointed time with 9 members and 4 guests present. Two guest requested membership.

After introductions the chairman asked for comments and/or corrections to the minutes from the Orlando, FL meeting. There being no comments a motion was made and seconded to accept the minutes as written.

Old Business:

The IEEE Standards Board has still not sent any copies of the revised C57.12.91-2001 to all the working group members. The Chairman will contact IEEE to see why the standard has not been sent to the W.G. members.

Jeewan Puri was not present to make any recommended changes on average A-weighted sound level measurements. (However, I spoke to J. Puri after our meeting and he promised to email the standard he is working on to me and I will forward it to the W.G. He says we can consider replacing the entire Clause 13 with the similar clause being written for C57.12.90)

SubashTuli was not present to make comments on adopting IEC cooling class designations.

Wayne Hansen was not present to provide wording for the changes he recommends to the next revision on Insulation Power Factor Testing.

Nigel McQuin was not present to provide his comments on wording for his proposed changes on resistance measurements, dielectric tests and temperature testing.

It was noted that there are no changes required to the test code as a result of recent revisions to C57.12. 01.

New Business:

The Chairman passed out copies of the proposed changes to C57.12.90 Table 5, Temperature Correction of Power Factor Testing to see if there was any interest pursuing a similar set of correction factors for C57.12.91. No one present indicated an interest in adding similar correction factors to our standard.

Don Kline informed the W.G. that the power transformer engineers are preparing PC57.123 Loss Measurement Guide to address transformers where the power factor is 3% or less. This Guide will provide for a "Certification of the Test Set" used to measure losses. This means that not only will each component of the set be required to be calibrated but also that the entire set be calibrated together. Don thinks that the dry type manufacturers should be made aware of this certification because customers may require the same for dry type transformers once they get used to the certification from the liquid filled power transformer companies. Don further pointed out that few if any dry type transformers have power factors below 4%.

Don Kline informed the W. G. that there is a task force under C57.12.90, which is developing a guide for the conversion of losses from 50 HZ to 60 HZ or visa versa. Primarily, this task force is concerned with transformers greater than 30 mVA, which are being imported to the USA from countries where 60 HZ is not readily available for testing.

A motion was made and seconded to adjourn, meeting adjourned at 2:15 pm.

Submitted by Chuck Johnson, Secretary

10.2 Distribution Transformers SC – Ed Smith, Chair

Meeting Time: 3:00pm, Wednesday, April 17, 2002

Attendance: 45 Total

26 Members

17 Guests

2 Guest Requesting Membership

10.2.1 Chair's Remarks & Announcements:

Review of Administrative Committee meeting highlights

- Future Meetings.
- New Members
- "Sponsored Breaks"
- Transformer Standards Activity

10.2.2 Working Group Reports

10.2.2.1 C57.12.20 Single Phase Pole Mounted Distribution Transformers (Copyright: IEEE/NEMA – Joint Copyright MOU)

Alan Wilks & Glenn Andersen Co Chairs

(awilks@ermco-eci.com & gwanders@duke-energy.com)

PAR Status: Submitted December 2001

PAR Expiration Date: End of 2005

Current Standard Date: 1997
Current Draft Being Worked On: #VII Dated April 2002
Meeting Time: 11:00am, Monday, April 15, 2002
Attendance: 36 Total
 14 Members
 22 Guests

Issues, Remarks & Announcements:

- Introductions were made and the Orlando minutes were approved.
- Alan Wilks gave a status update of our PAR. It was submitted to IEEE in December, 2001. As far as we know, it was approved and the PAR is current.
- Draft VII, dated April, 2002, was reviewed. The changes were noted on a separate handout sheet. It was agreed to leave the tolerance on Tables 8 and 9 at ± 0.4 mm except to reference the tolerance as a note under the heading of “size of terminal opening” column.
- It was agreed to place a ± 0.8 -mm tolerance on “B” dimensions of Figure 5B – hole spacing on spade terminals. The reason was to avoid conflict with devices that bolt onto the spade.
- There was considerable discussion about using a metric only style of dimensioning and other measurements. It was pointed out that the standard is almost universally used in countries where Imperial units of measure are customary. The metric unit of measure would cause users to make conversions to Imperial units and could cause many errors in the process. The Working Group was in favor of a dual dimensioning system where both metric and imperial units of measure were shown.
- It was mentioned that C57.12.25, had been submitted with dual dimensioning and units of measure. Two enclosure integrity standards are currently out for ballot with metric units shown and imperial units in footnotes. Apparently footnotes and informative annexes are acceptable places to show imperial units of measure.
- Glenn Andersen and Alan Wilks will issue a Draft VIII showing imperial units in footnotes or informative annexes. They will send to W.G. members for an on-line e-mail W.G. vote. We will look to Ed Smith, our S.C. chair for guidance on metrification.
- There were two items of new business.
 - o Jerry Corkran had previously questioned Table 6; why is there a statement “Single Phase Transformer Bushings Only”? Does it apply to three phase? Does it only apply to 95 KV BIL or also 125 and 200 KV BIL?
 - o Bikash Basu from Southern California Edison will check with Gerry Paiva to see why the extra creep bushings apply to 16340volt units only or 95 KV BIL and why 125 and 200KV BIL is listed below the “single Phase...” statement also.
- John Borst questioned the wording of paragraph 6.3.3.2 regarding labeling LV leads A, B, C & D. Glenn Andersen and Alan Wilks will suggest a reworded paragraph to clarify.
- The meeting adjourned at 12:10 PM.

10.2.2.2 C57.12.23 Single Phase Submersible Distribution Transformers(Copyright: IEEE)

Al Traut & Roger Lee Co Chairs

(alant@keco.com & leerj@sce.com)

PAR Status: Approved 3/18/1999 (For Standard Revision)

PAR Expiration Date: N/A

Current Standard Date: 1992, Reaffirmed 1999

Current Draft Being Worked On: #IV

Meeting Time: DID NOT MEET

Attendance: N/A

Issues, Remarks & Announcements:

- The working group did not meet at the Vancouver meeting. Since the last meeting, draft 4 was balloted by the IEEE. Of the 63 ballots returned there were 60 affirmative, no negative and three abstentions. The editorial comments received will be included in this draft before submitting to IEEE RevCom in May. Technical comments will be tabled for future WG action.

10.2.2.3 C57.12.25 Single Phase Padmounted Distribution Transformers (Copyright: IEEE/NEMA – Joint Copyright MOU)

Ali Ghafourian & John Lazar Co Chairs

(ali.ghafourian@us.abb.com & john.p.lazar@nspco.com)

PAR Status: Approved 12/08/1998 (For combining Standards C57.12.25 & C57.12.21)

PAR expiration Date: End of 2002

Current Standard Date: 1990

Current Draft Being Balloted: #VIII

Current Draft Being Worked on: #I Dated: April 2002

Meeting Time: 1:45pm, Monday, October 15, 2001

Attendance: 35 Total

19 Members

16 Guests

Issues, Remarks & Announcements:

- Status of C57.12.25: Has been balloted; all negative votes were resolved. Sent to IEEE October 2001. Need to submit to RevCom by May 03, 2002. Takes 3 – 9 months to get published.
- Status of combined standards °25 & °21: Draft 1 of the combined standards C57.12.25 (Dead Front) and C57.12.21 (Live Front); 10 were distributed.
- Draft Revision #: 1 C57-12-25 & C57-12-21 Draft Date: April 2002
- The W.G. voted and approved to expand the KVA range to include 10 & 15 KVA in the combined standard.
- The W.G. voted and approved to NOT include 250 KVA in the standard.
- Table 1 and Fig. 1A reviewed and discussed metrification in detail. The W.G. agreed that, in order to eliminate any confusion and mistakes in conversion between English and metric dimensions IEEE should allow dual dimensioning in our documents.
- Mr. Ed Smith, Sub. Com. Chair, has agreed to resolve the metrification issue with IEEE.
- The meeting adjourn at 02:45 PM

C57.12.28, C57.12.29, C57.12.31 & C57.12.32 Standards previously under the NEMA Secretariat are reviewed and revised NOW under the IEEE Transformer Committee Secretariat)

10.2.2.4 C57.12.28 Pad-Mounted Equipment Enclosure Integrity (Copyright: IEEE/NEMA – Joint Copyright MOU)

Bob Olen & Dan Mulkey Co Chairs (bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Submitted (Covered under continuous development) Anticipate approval by NES Com May 09, 2002

PAR expiration Date: Anticipate Completion by December 2004

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: #1.0 Dated: N/A

Meeting Time: April 16, 2002 Time: 8:00 AM

Attendance: 42 Total

25 Members

17 Guests

Issues, Remarks & Announcements:

- Line item review conducted of current ANSI C57.12.28 Standard
- Routine Design and Conformance Test definitions to be reviewed
- Penta Head Bolt will be redesigned to include washer
- Design of the Pry Bar Tool will be reviewed. Either a new design or a written description of the tool will be created.
- The probe wire will be reviewed
- The salt spray paint test will be eliminated from the standard
- All of the remaining paint tests were reviewed with no changes suggested at this meeting
- The Prohesion Corrosion Test for paint was presented. A recommendation was made to compare the Prohesion Test to the SCAB Corrosion Test currently included in the standard. Round Robin testing will be conducted. Four companies volunteered to conduct testing – other companies were encouraged to contact the working group chairman and participate in the testing.
- The ANSI Format will be converted to the IEEE Format and presented at the October 2002 meeting
- Two concurrent sessions were scheduled to discuss the 4 Enclosure Integrity Standards. The review of C57.12.28 ended at 10:35 AM, which only allowed for a 10 minute discussion of the C57.12.29 Standard

10.2.2.5 C57.12.29 Pad-Mounted Equipment Enclosure Integrity for Coastal Applications (Copyright: IEEE/NEMA – Joint Copyright MOU)

Bob Olen & Dan Mulkey Co Chairs

(bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Submitted (Covered under continuous development) Anticipate approval by NESCOM May 09, 2002

PAR expiration Date: Anticipate Completion by December 2004

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: #1.0 Dated: N/A

Meeting Time: April 16, 2002 Time: 8:00 AM

Attendance: 42 Total
25 Members
17 Guests

Issues, Remarks & Announcements:

- Recommendation to keep C57.12.29 and C57.12.28 as separate documents. IEEE Editorial Staff and NESCOM Representative. Working Group supportive of the separation.
- Due to the time restraints only the major requirements of the standard were presented.
- Substrate performance requirements dictating the use of a minimum of 409 stainless steel
- Enclosure security section will be copied from C57.12.28 into this standard
- Coating System requirements reviewed
- Corrosion resistance of the coating system is dictated by an Outdoor Coastal Test Site Exposure Test
- Remaining 6 coating tests viewed by working group
- The meeting was adjourned at approximately 10:50 AM.

10.2.2.6 C57.12.31 Pole Mounted Equipment Enclosure Integrity (Copyright: IEEE/NEMA – Joint Copyright MOU)

Bob Olen & Dan Mulkey Co Chairs

(bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Approved by NESCOM December 2001

PAR expiration Date: December 2005

Current Standard Date: ANSI/NEMA 1996

Current Draft Being Worked on: 1.4 Dated: March 26, 2002

Meeting Times: April 16, 2002 Time: 8:00 AM

Attendance: 42 Total
25 Members
17 Guests

Issues, Remarks & Announcements:

- PAR APPROVED Draft currently being balloted by IEEE to IEEE – SA members. 62 Members signed up to ballot the standard. The due date for ballots is May 22, 2002.

10.2.2.7 C57.12.32 Submersible Equipment Enclosure Integrity (Copyright: IEEE/NEMA – Joint Copyright MOU)

Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)
PAR Status: Approved by NESCOM December 2001
PAR expiration Date: December 2005
Current Standard Date: ANSI/NEMA 1994
Current Draft Being Worked on: 1.3 Dated: March 26, 2002
Meeting Times: April 16, 2002 Time: 8:00 AM
Attendance: 42 Total
25 Members
17 Guests

Issues, Remarks & Announcements:

- The meeting was called to order at 8:00 AM on Tuesday, April 16, 2002.
- Opening remarks related to the responsibilities of the IEEE Enclosure Integrity Working Group
- Introductions of all members and guests present
- Minutes of October 16, 2001 meeting in Orlando were approved by the Working Group
- Status of C57.12.32 Standard presented – PAR APPROVED
- Draft currently being balloted by IEEE to IEEE – SA Members. 56 Members signed up to ballot the standard. The due date for the ballots is May 24, 2002

10.2.2.8 C57.12.33 Guide For Distribution Transformer Loss Evaluation (Copyright: IEEE)

Don Duckett & Tom Pekarek Co Chairs
(don.duckett@fpc.com & tjekarek@firstenergycorp.com)
PAR Status: Due to expire this year – PAR extension request will be filed this month
PAR expiration Date: December 2002
Current Standard Date: October 2001
Current Draft Being Worked On: #9 Dated N/A
Meeting Date: 04-16-02 Time: 11:00
Attendance: 41 Total
21 Members
17 Guests

Issues, Remarks & Announcements:

- The unresolved negative votes on Draft 7 are related to Clause 6, the transformer efficiency tables from NEMA TP 1. Discussions at the Tuesday, April 16 meeting produced a revision for the draft document that we believe will resolve the negative votes. The revision removes all of Clause 6 except the following sentence: “When a user chooses not to use the procedures as defined in Clauses 1 through 5 of this standard, Department of Energy and/or NEMA documents can be used

to define minimum acceptable efficiency limits”. The proposal will be incorporated into Draft 9 and submitted for a re-circulation ballot in a few months.

10.2.2.9 C57.12.34 Three-Phase Padmounted Distribution Transformers (Copyright: IEEE)

Ron Stahara & Steve Shull Co Chairs

(rjstahara@msn.com & sshull@empiredistrict.com)

PAR Status: Approved 9/21/1995 (For Standard Development)

PAR expiration Date: December 2002

Current Standard Date: NEW Standard Under Development

This NEW Standard is a combination of the following two Standards

C57.12.22 1989 (Three-Phase Padmounted Distribution Transformers with H.V. Bushings)
(Copyright ANSI)

C57.12.26 1992 (Three-Phase Padmounted Distribution Transformers with Separable
Connectors) (Copyright ANSI)

Current Draft Being Worked On: 8

Dated: January 2002

Meeting Date: 04-15-02

Time: 03:15 – 04:30

Attendance: 40 Total

23 Members

17 Guests

Issues, Remarks & Announcements:

- Ed Smith opened the meeting by asking Noelle Humenick to give us a clear direction on the metrification of this standard. Noelle indicated that the document must be in metric units with the exception of hardware items such as bolts and fasteners. She did point out that the imperial units could be placed in footnotes and informative annexes. She clarified that these are not considered to be a part of the standard but are there only for clarification. A few interesting comments came from this discussion. These are listed as follows:
 - o Kent Miller, T&R Electric stated that he would disapprove any standard that has just metric units.
 - o Don Duckett, FPL, pointed out that his company would not be using any metric units in any of their internal standards. They made this decision based on safety issues with the lineman’s installation of hardware.
 - o Brian Klaponski, Carte International, commented that even though Canada converted their measurement system to metric, there continues to be items that remain in the imperial measurement system.
- After this discussion, it was the consensus of the group that the metric only version of a standard was a problem for users and producers, and that a dual measurement system was more consistent to the needs of the industry that use distribution transformers. With this in mind, Ed Smith suggested that a call be made to IEEE to discuss this issue.

- Steve Shull reported that the standard was out for ballot and to date had 23 returns. The total pool was somewhere around 100 individuals. In this group of returned ballots, there were two disapprovals.
- Ron Stahara stated that one of the negatives concerned the specified secondary voltages. The commenter wanted the standard more internationalized by changing this secondary voltage to 1000V or less. After some discussion, Ken Hanus summarized that the intent of the standard was for specific voltage designs and configurations more specifically targeted to the Americas rather than Europe. He pointed out that Europe doesn't use these designs or configurations. The consensus of the group was to leave this as it is now written.
- Ron Stahara stated that the other negative had to do with the impedance ranges of the various unit sizes. Ron said that this had been discussed in the past and the footnote was added to this table to provide a warning that some of the impedances will result in high currents. He felt that for the present draft it should stay the same. The group agreed.
- Ron said that he had been approached by Mike Culhane concerning Figure 2 configuration. He asked him to review his concern. He explained that the parking stands are shown extended and had an additional parking stand. He felt that this should have flush parking stands and the additional parking stand that is shown on the lower right side of the bushing "V" should be eliminated. The group agreed that this should be changed.

10.2.2.10 C57.12.35 Bar Coding For Distribution Transformers (Copyright: IEEE)

George Henry Chair (gehenry@centralmoloneyinc.com)

PAR Status: Active for Reaffirmation

PAR expiration Date: The PAR expires December 2002

Current Standard Date: 1996

Current Draft Being Worked On: NONE

Meeting Time: DID NOT MEET THIS SESSION

Issues, Remarks & Announcements:

- Document balloted for reaffirmation. Ballot closed on 03-04-02. See attached sheet for ballot summary of IEEE Transformers Committee, which closed with 81% returned ballots, 95% affirmative votes. No attempt made, as yet, to resolve negative ballots. Ballot summary of ASC57. This ballot was not successful, with only 10 of 26 eligible voters returning ballots (38%). This ballot deadline is being extended for 60 days (May 3, 2002).
- Ballot Summary
C57-35-1996 Reaffirmation: IEEE Standard for Bar Coding for Distribution Transformers closed March 04, 2002.
77 Number of eligible people in Ballot Group

60 Affirmative votes
03 Negative votes
0 Abstention votes
63 Votes = 81% Returned
0% Abstention

60 Affirmative votes
3 Negative votes
63 Votes = 95% Affirmative

10.2.2.11 C57.12.36 Distribution Substation Transformers (Copyright: IEEE)

John Rossetti & Leon Plaster Co Chairs

(jrossetti@mlgw.org & leon.plaster@us.abb.com)

PAR Status: The PAR will be revised to include the definition of Distribution Transformers and then resubmitted along with C57.12.10. (see below)

PAR expiration Date: Not Yet Approved

Current Standard Date: NEW Standard Under Development

Current Draft Being Worked On: #1 Dated April 4, 2002

Meeting Date: 04-16-02 Time: 1:45PM

Attendance: 22 Total

11 Members

10 Guests

1 Requested Membership

Issues, Remarks & Announcements:

- The PAR will be revised and resubmitted along with C57.12.10, prior to the June NESCOM meeting. Another old standard, C57.12.13 (Conformance req'ts for unit subs), will be added to the document review list. Due to many large industrial applications, we'll need to keep in mind potential NEC and NESC issues. Regarding the draft document, there was discussion in three areas; KVA ratings, voltage ratings, and BIL Tables. The lower limit for single phase KVA will be removed from the scope. Acceptable voltage ratios will be added. A single BIL valve will be provided for each voltage class.
- Minutes from WG to develop C57.12.36, Liquid-Immersed Distribution Substation Transformers; April 16, 2002 – Vancouver, BC
- The working group for Distribution Substation Transformers met on Tuesday, April 16, 2002, at 01:45 PM. There were 21 people in attendance, 11 members, 10 guests and 1 request for membership. This brings the total membership count to 36.
- Minutes from the Orlando meeting were distributed and no changes were suggested.

- The status of the PAR was reviewed. A conference call was held on April 3^d [Jim Sim, Tom Prevost, John Rossetti, Dave Aho, and Daleep Mohla – from NESCOM] and the purpose of this call was to try and clarify everyone’s position on the revision of C57.12.10 and the development of C57.12.36. The result was an agreement to remove the lower end ratings from the scope of C57.12.10 and simply refer to the definitions in C57.12.80 for distribution and power transformers.
- The PAR for both C57.12.10 and C57.12.36 will be revised and forwarded to NESCOM for review prior to their meeting in June.

Document Review:

- John Rossetti suggested that C57.12.13 (conformance requirements for liquid-filled transformers used in unit installations, including unit substations) should be evaluated to determine if any information should be incorporated into C57.12.36. Additional documents on the review list are NEMA TR 11, NEMA 201, NEMA 210 and C57.12.10.
- One concern raised was that since many of the applications for the transformers encompassed by this standard will be directed toward large industrials, will we need to deal with any NEC or NESC issues? There is no specific action necessary at this time.

Issues from the draft document dated 04-04-02:

- Scope and KVA Ratings – decided not to have a lower end KVA limit in the scope for single phase ratings. Standard KVA ratings will be stated in a table. Although this creates a rating overlap with the single phase overhead product standard (C57.12.20), the user will need to select the standard most applicable to their application.
- Voltage Ratings – Instead of having tables, we’ll refer to C57.12.00 and C84. There will be some thought put into acceptable voltage ratios based on KVA ratings.
- BIL Tables – After much debate, we decided to keep a table and recommend only one BIL level for Each voltage class. Although not everyone was in agreement, the direction was to state the most common BIL levels, specifically for 25 and 34.5 KV class, that provided a higher margin of protection. (25 KV – 150 BIL, 34.5 KV – 200 BIL). A statement will be added to refer the user to C57.12.00 for other available ratings.

We ran out of time just as the exciting debate over impedance valves was starting. Everyone was asked to submit comments as quickly as possible on the remainder of the document. The meeting adjourned at 03:00PM. .

10.2.2.12 C57.15 Step-Voltage Regulators (Copyright: IEEE)

Craig Colopy & Gael Kennedy Co Chairs

(ccolopy@cooperpower.com & grkenne@nppd.com)

PAR Status: Approved

PAR Expiration Date: December 2004

Current Standard Date: C57.15 – 1999 – Published April 2000

2 Requested Membership

Issues, Remarks & Announcements:

- At the fall meeting in Orlando – 2001, the suggestion was made to add voltage regulators to the scope of the document. This is being tabled until the next PAR is requested because a change in the scope will require a new PAR.
- At the fall meeting in Orlando – 2001, the suggestion was made to identify and specify general types and classes of insulation fluid in paragraph 4.3.9. The working group decided to leave the paragraph general and let any definition be agreed upon by the user and producer.
- Paragraph 5.3.2 – correct the reference by “standard set of test data described in 5.2.2”.
- It was suggested that new fields be added to the data set so users could calculate loss of life in actual equipment location. The working group decided to change Paragraphs 5.3.2 and 5.3.3 which would accommodate this need. The new wording is as follows:

Paragraph 5.3.2 –“When the user specifies a standard data set and a comma delimited file, they will receive the standard set of test data described in 5.2.2, except the data set length can vary from the specified table but must conform to those data types outlined in the table.”
- Paragraph 5.3.3 (Last sentence) “ Only the single line record is offered, similar to the consolidated record described in 5.2.4, except the data set length can vary from the specified tables but must conform to these data types outlined in the tables.”

10.2.3 Subcommittee Old Business: - NONE

10.2.4 Subcommittee New Business:

- NEMA/IEEE MOU Termination
- Metrification, Metrification/Imperial “Dual Format”

Submitted by Ed Smith

10.3 Dielectric Tests SC – Loren Wagenaar, Chair

The Dielectric Test Subcommittee (DTSC) met on Wednesday, April 17, 2002, at 1:30 p.m., in Vancouver, BC, Canada at the Westin Bayshore Resort & Marina, with 41 members and 52 guests present. 13 of the guests requested membership on the Subcommittee. They include: Enrique Betancourt, Jeffrey Britton, Frank Damico, Marcos Ferreira, Myron Gruber, Roger Hayes, Thang Hochank, Tim Huff, Sheldon Kennedy, Boyd Leuenberger, Trio Ngnegueu, Pierre Riffon, Roger Verdolin,

10.3.1 Chair’s Remarks

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on April 14, 2002. (See Section 3.0 for additional details of the

Administrative Subcommittee meeting).

- 1) The Chair expressed his appreciation for the excellent work of Mike Franchek, who has resigned as Secretary of the SC. Stephen Antosz has agreed to be the new Secretary.
- 2) Eric Davis is representing the SC at the WG on Web-page Development, being held at the same time as our meeting. The Chair has requested that the Web-page WG be held at an earlier time slot so that our representative can make an up to date report at our meeting.
- 3) Next meeting dates and locations are as follows: Fall 2002: Oct 20-24 – Oklahoma City, Oklahoma, and Spring 2003: March 16-20 – Raleigh, North Carolina. It is planned that the Spring meeting will have some coordination with the Switchgear Committee. Hence, relevant tutorials dealing with switchgear and transformers will be planned. For instance, one by the PCS WG on, “ Switching Transients“. Further details included with Committee Minutes. Potential hosts for future meetings should contact Greg Anderson (gwanderson@ieee.org).
- 4) The Adm SC discussed and voted against combining the spring 2004 Transformer Technical Committee meeting with the General PES Meeting in June 2004 in Denver. This was originally a request from PES as part of an effort to promote greater interaction and exchange of ideas between Committees.
- 5) Minutes of the Orlando meeting are available on the IEEE Committee Web Site
- 6) Chairmen of WGs and SCs should draft Secretaries to their committees who can chair the meetings on their behalf when they could not attend for personal or professionally related reasons. This will also avoid canceling such meetings.
- 7) Each WG and TF chairman will need to check the status of the PAR of the document worked on.
- 8) Dielectric Test SC will have a Liaison in the FRA testing WG to be formed as part of PCS.
- 9) One of the tutorials planned for future Committee meetings will deal with Emerging Technologies related to Transformers.

Note: Individuals who wish to receive invitations to ballot on IEEE Standards have the responsibility to make sure their correct e-mail address is on file with IEEE. Status can be checked on the following website, or adjacent related websites: <http://standards.ieee.org/db/balloting/ballotform.html>

The minutes of the meeting held on October 17, 2001 in Orlando, Florida were approved as written.

10.3.2 Working Group Reports

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

18 members and 23 guests attended the meeting.

Minutes of the previous meeting October 15, 2001 in Orlando, Florida were approved.

Discussions continued on the Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors. Sections on factory test procedure with

an electrical trigger, integrating results with data from oil analysis, interpretation of acoustic activity and recent signal processing techniques were reviewed.

The WG discussed ideas for a seminar on the content of the Guide at the upcoming Fall meeting.

10.3.2.2 Working Group on Revision of Low Frequency Dielectric Tests - Mark Perkins, Chair

The working group met Monday, April 15, 2002 at 3:15 PM with 16 members and 24 guests present. 4 people applied for membership in the working group. After the introduction of members and guests, the minutes of the last meeting in Orlando were approved.

The chairman distributed the results of the latest survey on changes to C57.12.90 pertaining to low frequency dielectric tests. The survey included issues on changes to Table 5 temperature correction of power factor test results, dielectric tests for control wiring, and tests on repair or rebuilt transformers. The main point of disagreement was in power factor temperature correction for certain types of distribution or small power transformers. A compromise solution was proposed which allows manufacturers of Class I transformers to select either curve depending on the construction, materials, and processing. Distribution transformers will continue to use the existing temperature correction curve until a better alternative is developed. This new proposal will be sent to the working group and subcommittee for comment.

The other issues on the survey, including dielectric tests on control wiring and dielectric tests on repair or rebuilt transformers will be forwarded for inclusion in the next revision of C57.12.90.

C57.113 the standard for partial discharge testing is past the 5-year cycle and there is not time to get revisions approved before the PAR expires. We will have the existing standard balloted for reaffirmation this year and then consider revisions.

10.3.2.3 Working Group on Revision of Impulse Tests - Subhash Tuli, Chair

The WG met on April 16, 2002 from 3:15 pm to 4:30 pm. Eleven members and twenty-seven guests attended the meeting. Five guests requested membership. The meeting was chaired by Mr. S. Tuli. The minutes of the Orlando meeting were approved as written.

After attendance introduction, Mr. Art Molden gave an update of the work that will be initiated for the revision of IEEE Std. 4. He indicated that a Power Point presentation will be available on the IEEE Web site comparing the existing IEEE Std. 4 with the previous edition as well with the IEC 60060-1 and IEC 60060-2. A. Molden is the liaison with this Committee. Members were encouraged to have a look on this document since this is one of the main references for the revision of the Impulse Test Guide (C57.98).

10.3.2.3.1 The remaining part of the meeting was dedicated to the TF on Revision of Impulse Test for Standard C57.12.00 and C57.12.90. This TF is chaired by Mr. Pierre Riffon.

The TF chair presented of proposal for modification to clause 10.3.1.1 b) of C57.12.90. This proposal has been also presented at the Amsterdam meeting. The proposal consists of specifying a minimum available energy from the impulse generator during impulse tests for cases where the tail time duration of the impulse waveshape is shorter than the minimum allowable limit (e.g. 40 μ s).

The actual standard requires a minimum impulse generator capacitance of 11 nF. Calculations made on several cases, and presented during the meeting, showed that this value is totally inadequate for the range of transformer ratings (rated voltages and rated powers) covered in C57.12.00 and C57.12.90.

The concept presented will give a minimum tail time " t_2 " for a specific transformer rating (power, BIL and leakage impedance) i.e. a minimum impulse generator capacitance to be used for a specific transformer rating (not a single value for the whole range covered by C57.12.00).

Because the insulation dielectric withstand capability is function of the duration of the applied voltage, it is important to give minimum rules to the industry in order to have meaningful tests and well defined common minimum requirements.

This concept is forcing laboratories to use the optimum configuration of their impulse generator. It is also ensuring the industry that a minimum testing installation capability is required for a specific range of transformers.

The proposal requires 5 energy levels ranging from 12,5 kJ to 100 kJ depending of the transformer rated power. Classes has been defined in the same way as already defined for short-circuit performance. Class IV (≥ 10 MVA single phase and ≥ 30 MVA three-phase) has been split in two classes since this transformer class is too broad. The goal of the proposal was not to cover all possible cases but to cover in between 80% to 90 % of the studied cases. For Class IVb, the proposal covered only 48% of the cases since the value proposed is more or less the maximum that could be specified considering existing installations.

The proposal is as follows:

To change the first paragraph of indent b) of clause 10.3.1.1 of C57.12.90 as follows:

"The impedance of some windings may be so low that the desired time to the 50% voltage point on the tail of the wave can not be obtained with available test equipment. In such case, shorter waves are acceptable provided that:

- 1- The optimum impulse generator connection is used (use of parallel stages, largest available capacitance);

2- The available energy from the impulse generator with the actual test connection and charging voltage is equal to or higher than the values given in the following table:

Three phase (kVA)	Transformer category	Single phase (kVA)	Minimum available impulse generator energy during tests ^{1,2} (kJ)
15 to 500	I	5 to 500	12,5
501 to 5000	II	501 to 1667	25,0
5001 to 30000	III	1668 to 10000	25,0
30001 to 240000	IVa	10001 to 80000	37,5
> 240000	IVb	> 80000	100,0

1- Applicable only if the impulse tail time parameter ("t₂") is outside the prescribed tolerances (50 μs ± 20%).

2- Any generator connections can be used during tests if the impulse waveshape "t₂" parameter is within the prescribed tolerances."

Manufacturers are requested to provide feedback to the TF on the proposed values for discussion at the next meeting.

For the next TF meetings, the following subjects will also be addressed:

- front time during impulse tests;
- chopped wave test procedure, undershoot control;
- switching impulse test procedure.

10.3.2.3.2 Task Force for Revision of the Impulse Test Guide C57.98 – Art Molden

This Task Force met for the first time on Monday April 15th at 1:45 p.m. There were 41 guests present of which 19 expressed an interest in taking an active part in the revision of this guide.

A PAR application has been submitted for this project and final action will be taken on this at an upcoming meeting of the Standards Board on June 13th.

A brief review of the present impulse test guide was followed by discussion of some impulse testing and measurement techniques that were of special interest to those in attendance. It is the intention of this

Task Force to include additional tutorial information on the items from this list in our revision of the impulse guide.

Digital impulse recording techniques including :

- Display monitor or PC screen display resolution and limitations

Display and interpretation of pass/fail criteria

- Difference plots

- The use of the transfer function

More information on impulse wave shaping for both LI and SI

Impulse wave tail duration and Generator Capacitance, utilization of available IG stages.

The use of the Glaninger circuit.

Chopped Wave current recording

An Impulse Failure troubleshooting flow-chart.

The use of acoustic transducers to help locate impulse failures.

Calibration checks

Special considerations when testing transformers that incorporate nonlinear devices.

It is also the intention of this task force to “harmonize” this guide with C57.134 (?) Routine Impulse Testing of Distribution Transformers and also with the IEC 722, Guide to LI and SI Testing of Power Transformers and Reactors.

PDF and MS Word files of the present C57.98 document will be made available to those guests that had requested membership of this group on our attendance sheet. Additional documents including the latest draft of IEC 722 and a document comparing IEC 722 with IEEE C57.98, will also be provided to those prospective members.

10.3.2.4 Task Force on Liquid-Filled Transformers Dielectric Test Tables - Phil Hopkinson, Chair

The TF met on April 16, 2002 at 1:45 PM in Vancouver. There were 30 members and 16 guests in attendance.

The chairman reviewed the purpose of the TF as a mission to revise C57.12.00 Tables 3-7 and to recommend beneficial changes. He then presented revision 4 of the proposed charts that now contains maximum system voltage. A few changes were made on the draft.

The chairman plans to submit the current draft of these tables to the chair of the Dielectric Test SC for ballot.

10.3.3 Liaison Reports

10.3.3.1 Surge Protection Devices – Bob Degeneff

Robert Degeneff summarized from the following Draft 5A of an Amendment to C62.22, dated April 30, 2001:

Purpose

The purpose of this Amendment is to introduce a new concept of insulation coordination that provides a new method applicable to long duration waves exceeding 60 microseconds duration.

Scope

This Amendment describes the transformer insulation strength volt-time curve, its interpretation and application criteria relevant to insulation coordination in the application of surge protective devices (surge arresters) for transformer protection.

Description of the transformer insulation strength - volt-time curve

The insulation strength for liquid immersed transformers may be described by a continuous curve [Fig.1], [A1]. The curve is constructed through the following test points [A1]:

1. The front-of-wave (FOW) test: A lightning impulse having a crest voltage at 1.3 times the BIL, chopped at 0.5 μ s. This is not a standard test but may be used upon agreement between the user and the manufacturer.
2. The 3-us chopped wave (CW) test: A standard lightning impulse having a crest of 1.1 times the BIL, chopped at 3 μ s.
3. The full wave (FW) test: A standard lightning impulse having a crest voltage equal to the BIL, plotted at 8 μ s.
4. The switching impulse (SI) test: the BSL equal to 0.83 times the BIL plotted at 300 μ s. A standard test for system voltage rated above 230kV.
5. The induced voltage (IV) test: An induced voltage having a low frequency rms voltage equal to approximately 1.5 times the maximum system phase-to-ground voltage applied for one hour. The time duration above 90% of crest voltage is 1034 seconds.

Thus, the induced voltage test is not a function of the BIL but is plotted as a per unit value of the BIL. For example, for a 115 kV transformer with 450 kV BIL, with maximum system voltage of 121 kV; the induced voltage is 105 kV rms. The plotted crest value is 33% of the BIL.

Straight-line segments on semi-log paper are drawn through these five points.

In the lightning region, the curve is the crest voltage versus time to chop or time to crest. In the switching impulse and longer time region, the curve portrays the crest voltage versus the time duration above 90% of the crest voltage. The front-of-wave and chopped wave tests stress the turn-to-turn insulation while the full wave test stresses both the turn-to-turn and ground-to-wall or major insulation. The switching impulse test and the one hour induced voltage test describe the insulation strength for the long duration voltages that primarily stress the major insulation.

Interpretation of the transformer insulation strength - volt-time curve

Application Criteria

Insulation strength for non-self-restoring or internal insulation as typified by the transformer must be estimated by a subjective method. The subjective assessment compares the test voltages and their wave shapes to the oscillatory surges that may appear at the transformer terminals with equal volt-times as shown by the curve. In IEC 71-2 [1], the insulation strength, independent of the wave shape, is equal to the BIL (a chopped wave test is not required). The IEEE Insulation Coordination Standard [2] recommends:

- if the time to crest of the voltage surge that appears at the transformer terminals is less than $3\mu\text{s}$, the transformer insulation strength is equal to the chopped wave test, i.e., 1.10 times the BIL.
- if the time to crest of the voltage surge that appears at the transformer terminals is more than $3\mu\text{s}$, the transformer insulation strength is equal to the BIL.

These simple criteria do not cover all possible events. A careful consideration has to be given to long-tail voltages. In [A2], some examples are given to explain the nature of the problem and to illustrate the insulation coordination process for long-tail surges. The suggested criteria are as follows [A2]:

(1) For short-tail incoming surges (i.e., t_c less than/equal to $60\mu\text{s}$) **See Note Below**

a) if $t_T \leq 3.0\mu\text{s}$ and $E_t/E_d \leq 1.10$, then

$$\text{BIL} = (\text{PR}) E_d$$

b) if $t_T \leq 3.0\mu\text{s}$ and $E_t/E_d > 1.10$, then

$$\text{BIL} = (\text{PR}) E_t/1.10$$

c) if $t_T > 3.0\mu\text{s}$, then

$$\text{BIL} = (\text{PR}) E_t$$

(2) For long-tail incoming surges (i.e., t_c more than $60\mu\text{s}$) **See Note Below**

(for example, incoming surge caused by a shielding failure without a flashover)

$$\text{Minimum BSL} = (\text{PR}) E_d$$

$$\text{Minimum BIL} = (\text{PR})/0.83 E_d$$

Note:

t_c - the time during which the arrester voltage significantly decreases, may be estimated by the equation:

$$t_c = -\tau \ln \frac{0.77 E_{10} + V_{PF}}{2E}$$

- E - crest voltage of the incoming surge
- E_{10} - arrester discharge voltage at 10 kA using 8/20 current wave
- τ - tail time constant
- V_{PF} - power frequency voltage (crest value)
- t_T - the time to crest of the transformer voltage
- E_t - voltage to ground at the transformer
- E_d - arrester discharge voltage, i.e., voltage to ground
- (PR) - Protective ratio (a value of PR=1.2 has been suggested)

Protective margins (ratios) suggested and used for the transformer range from 10 to 30 percent (PR = 1.1 to 1.3). The larger margins generally apply to assessment methods that do not consider the actual surge voltage that impinges on the transformer. When the actual voltage at the transformer is considered, the margins used or suggested reduce to about 15 to 20%. The ANSI/IEEE C62.22-1997 “Guide for the Application of Metal Oxide Surge Arresters for Alternating Current Systems” [3] suggests a margin of 15% for non-self restoring insulation. A factor of 20% margin for non-self-restoring insulation is suggested for general use.

The curve in the lightning impulse region is unchanged from previous representations [3] except that now the curve is continuous. In the switching impulse and power frequency region, the continuous curve versus the logarithm of time is new and may be used when considering the effect of long tail surges.

REFERENCES:

- [1] IEC 60071-2, 12/02/97, “Insulation Coordination - Part 2: Application Guide”
- [2] IEEE 1313.1 -1996, “Insulation Coordination - Part 1: Definitions, Principles and Rules”
- [3] ANSI/IEEE C62.22” Guide for the Application of Metal Oxide Surge Arresters for Alternating Current Systems” 1998.

ANNEX A BIBLIOGRAPHY

- [A1] P.M. Balma, R.C. Degeneff, H.R Moore, L.B.Wagenaar, “The Effects of Long Term Operation and System Conditions on the Dielectric Capability and Insulation Coordination of Large Power Transformer”, IEEE Trans. On Power Delivery, vol. 14, No. 3, pp. 960-971, July 1999.

[A2] A.R. Hileman “Insulation Coordination”, Marcel Dekker, Inc., 1999

Revised: April 30, 2000, by Eva Tarasiewicz based upon WG 3.4.8 suggestions following the Fall (September, 1999) Meeting.

10.3.3.2 IEC TC14/WG24 – Loren Wagenaar

The next meeting of IEC TC14 will be held in Rome, Italy during the week of September 23, 2002. Phil Hopkinson plans to attend this meeting, but Loren does not know if he will be able to attend.

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

The last meeting was held at the facilities of Florida Power and Light in West Palm Beach, Florida on April 8th and 9th, 2002. There were 10 members present.

The main topics discussed at the meeting included the following:

Round Robins:

It is still the intent of the HVTT to complete the high voltage measurement “Round Robins”. Two high voltage measuring systems, one of impulse voltage and one of ac voltage, are to be circulated around various test laboratories and test departments within North America. The purpose is to obtain comparative measurement data from those sites. This project has been under way for several years but for various administrative reasons the equipment hasn’t actually started the tour yet. It is hoped that this project will get underway this year.

Anyone interested in participating in this project please contact me, A.Molden@ieee.org

Committee Paper

A paper entitled “IEEE-4 High Voltage Testing Techniques Past, Present and Future” was presented at the Atlanta T& D show last year. This paper lists all the editorial and technical differences that exist between the 1978 and 1995 versions of Standard 4 and also, the editorial and technical differences between the 1995 Standard 4 and the equivalent IEC documents, IEC 60060-1 and IEC 60060-2. It is the intent of the HVTT committee to use this paper as a basis for the next revision of Standard 4. A Power Point presentation of the paper will be published on the IEEE web site in the near future, I will inform members of the Dielectric Test SC by email and provide a link to the presentation page, as soon as it is available.

Standard 4 Revision

Standard 4 contains definitions, testing methods and measurement system specifications that are of particular interest to members of the Dielectric Test Subcommittee. Many of the clauses pertaining to those areas, for example calibration methodologies and impulse waveform definitions to name just two, are about to be revised. While the main intent of the HVTT committee is to provide clarification and more exacting definitions throughout the standard, there is also IEC harmonization to be considered.

The HVTT would appreciate any input that the Transformers Committee and in particular the Dielectric Test SC could provide regarding revision of these clauses.

The meeting was adjourned on the afternoon of April 9th with the intention of having another meeting sometime in the fall, at a location yet to be determined.

10.3.4 Old Business

10.3.4.1 Phase to Ground Clearances – Bill Chiu

Bill presented the results of his investigation of phase-to-ground clearance from various sources. The intention was to develop something similar for inclusion in C57.12.00.

The action from the last meeting in Orlando was to consider the NESC for applicable clearances for inclusion in the comparison. Here are my findings:

1. The NESC clearances are mostly for clearances of wires, conductors, cables, etc., to buildings, bridges, and related structures. These clearances consist of two components - the Reference Heights of the physical structure and the Electrical Component Clearance. My opinion is that only the Electrical Component Clearances are applicable to our effort of establishing minimum phase-to-ground clearances for transformers.
2. The Electrical Component Clearance is calculated using formula listed in Section 232D3, using the limiting criteria of steady state current of 5mA due to electrostatic effects. There is also a distinction between vertical clearance and horizontal clearance, each with a margin of safety of 1.2 and 1.0 respectively. For the sake of simplicity, I have selected the horizontal clearance from Table 234-4 for our comparison.

Bill asked how to proceed. There was much discussion but no decisions made. Following are some of the issues:

- Need to clarify if this will apply to transformer design clearances or substation.
- There are 2 portions of NESC; overhead line or substations. Maybe we should look as applied in substations rather than overhead lines.
- Table 13 is most optimistic, NESC is most conservative, IEC is in between.
- It is difficult to set clearances, even in bushing committees
- IEEE and IEC clearances are based on well-rounded electrodes
- NESC applies to utilities, NEC does not. Some utilities are bound to meet NESC by state law.

The SC ran out of time and the meeting adjourned at 2:45 PM.

Minutes respectfully submitted by Stephen Antosz, Secretary, May 19, 2002.

10.4 HVDC Converter Transformers & Smoothing Reactor SC – Richard F. Dudley, Chair

The S.C. met in the Cyprus 2 Meeting Room of the Westin Bayshore Inn in Vancouver, B.C. on April 15, 2002 from 1:45 p.m. - 3:00 p.m. There were 7 members and 6 guests present. One of the guests Robyn Taylor of Teshmont requested membership. The following are the highlights of the meeting.

1. The minutes of the Orlando meeting were approved.
2. IEEE C57.129 and IEEE 1277 were approved as full use documents at the March 2002 meeting of the IEEE Standards Board.
3. A discussion took place on the effects of new technologies such as FACTS devices on transformer design and hence standards. Voltage source converters are now being used in HVDC projects and transformer design must take converter characteristics into consideration. C57.129-1999 does not cover such transformers. A separate standard will probably be required to cover transformers used in conjunction with HVDC systems using voltage source converter technology. At the time of its next revision the scope of C57.129 should be clarified to reflect that it only covers 12 pulse current commuted thyristor converters. IEEE 1277, the smoothing reactor standard, is probably satisfactory to cover smoothing reactors used in association with HVDC systems based on voltage source converters.
4. The DC bushings standard is up for reaffirmation. Fred Elliott is requesting input from members of the HVDC Converter Transformers & Smoothing Reactors S.C. re the effectiveness of this standard. S.C. members who feel they can offer substantive input should ensure that they are part of the ballot group.
5. Peter Heinzig presented data on load loss measurements for 400 kV, 397 MVA HVDC converter transformers. A HP Impedance Analyzer was used for the measurements. The total time to measure harmonic factors (Fh) was approximately 1.2 hour. The IEC and IEEE methods were compared and results were comparable.

The IEEE method produced 0.5% lower harmonic losses. The harmonic loss factors (Fh) determined by measurement showed a 10% maximum deviation vs those calculated using the IEEE method. The use of the harmonic factor (Fh) as defined in IEEE 1158 is sufficiently accurate for the calculation of harmonic losses as is described in the current version of C57.129 and should therefore be included in the next revision of IEEE 57.129.

In the next revision of C57.129 it could be useful to include an Annex on harmonic loss measurement; impedance analyzers etc.

The S.C. adjourned at 3:00 p.m. Submitted by R. Dudley

10.5 Instrument Transformers SC – Jim Smith, Chair

8 members and 7 guests attended

10.5.1 Chair's Remarks & Announcements:

The dates and locations for future meetings were announced. The previous meeting minutes were approved as written

10.5.2 Old Business: None

10.5.3 New Business

Study Group on Partial Discharge Testing

A Partial Discharge Study Group will be set up and a time slot allocated for the next meeting. IEEE C57.124 and the IEC Standard will be reviewed. The plan is to add an annex to C57.13 which refers to C57.124 and defines any necessary deviations from it.

Plan for Splitting C57.13

A plan is needed for splitting C57.13. This could result in 4 standards or 2 standards with 2 parts each. This will be carried out by the WG for the revision of C57.13.

Thermal Evaluation

The present Standard does not cover the effects of variations in ambient temperature on long-term performance. In particular, the insulating oil and gasket performance at low temperatures and accelerated aging at high temperatures are of concern. Reports on accuracy vs temperature will be reviewed in the next meeting.

IEC TC38

Tony Jonatti has stepped down and is being replaced by Vladimir Khalin

Metering Group Liaison

Tom Nelson will be the liaison with ANSI C12.11 (Instrument Transformers for Revenue Metering 10 kV BIL Through 350 kV BIL)

10.5.4 Working Group Reports:

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

- 1) A total of 7 members and 5 guests attended the first session.

- 2) The chair reported the following:
 - a) The project will end at the end of year 2002, and therefore there is not much time for draft development.
 - b) After reviewed by the editorial department of IEEE Standards, the draft has been revised to draft D14.04.
 - c) The PAR for the working group was reviewed and revised to be in accordance with the draft development.
 - d) Draft D14.04 was submitted for electronic balloting approximately a week prior to the Vancouver meeting.
- 3) The remaining time was set for future development of the Standard pending on the committee approval (see 10.5.4.2).

10.5.4.2 Study Group on C57.13.5 - Pierre Riffon & Ross McTaggart

Pierre Riffon made a presentation on current transformers used for unbalance protection of capacitor banks. The issue is that in this application the CT's have a large number of primary turns and in the case of a flashover across one branch of the capacitor bank, a high frequency discharge current will circulate through the unbalance CT. Because of the relatively high inductance of the primary winding, this current causes a high voltage across the winding. To protect against this, zinc oxide arresters are generally used up to some MVA and open air gaps above this.

What is proposed is a voltage impulse test to confirm that the overvoltage protection is adequate – eg testing at 130% of the maximum voltage that can appear across the primary terminals. There is some doubt about the practicality of this test and the waveshapes that can be achieved. The manufacturers are to check the implications of this test and report at the next meeting.

Another possibility is to prescribe a “turn-to turn” test as is done on reactors. Ross McTaggart will make a presentation on this at the next meeting.

10.5.4.3 WG C57.13.6 – Working Group on Instrument Transformers for use with Electronic Meters and Relays – Paul Millward

Attendees: 11 total, 7 members 4 guests

Chris TenHaagen had provided by e-mail to Paul Millward a copy of part of the C57.13.6 draft for...”IEEE Instrument Transformer Accuracy and Burden Specifications for use with Electronic Meters and Relays”

Several copies were distributed to the floor.

Discussion took place regarding the status of the draft and appeared to still be currently active under the guidelines of the IEEE methods and procedures. It was recommended since Chris Ten Haagen was having difficulty attending meetings that a complete current document be forwarded to all the IT committee for review and comment in time for the October meeting in Oklahoma. A survey of the IT committee regarding the document should be made prior to the meeting for final discussion in Oklahoma. If Mr TenHaagen is unable to attend, it would be anticipated that the information required to follow through would be made available to either Mr. Smith or Paul Millward in time for the next meeting.

10.5.4.4 Working Group on C57.13 Revision – Tom Nelson

There were 9 members present at the meeting.

The last change to the draft standard was the addition of a partial discharge test. The standard will be surveyed within the working group, with a deadline of June 3, 2002. The standard will have to be in for vote before the October 2002 meeting.

10.5.4.5 Study Group on C57.13.2 – Tony Jonatti

PAR request to be made

Minutes Submitted by Ross McTaggart

10.6 Insulating Fluids SC – Frank Gryszkiewicz, Chair (Presented by Joe Kelly, Interim Co-Chair)

10.6.1 Introduction

The Insulating Fluids Subcommittee and its Working Groups met in Vancouver, B. C. Canada on Tuesday and Wednesday, April 16th and 17th, 2002. The subcommittee started its meeting at 11:00 a. m. on Wednesday. There were 33 members and guests present and introductions were made. The minutes of the April Orlando meeting are incorrect and will be corrected in this set of minutes. Frank Gryszkiewicz, the chair of the Subcommittee is recovering from surgery so Joe Kelly was asked to chair the meetings for him.

10.6.2 Old Business

PC57.139 Dissolved gas analysis in LTC's has Rick Ladroga as new working group chair.

Rick Youngblood had to leave the WG because of a responsibility change at his company. The WG was reenergized and refocused by the tutorial on the analysis of LTC oils which lead people to believe that the gas analyses could be done by ratios of gasses and therefore not by manufacturer or type of equipment.

The PAR expires this winter. A new PAR will be requested and the scope of the document will be formulated before the next meeting.

10.6.3 PC57.106 – Guide for Acceptance and Maintenance of Insulating Oil in Equipment.

This WG is chaired by Joe Kelly. The document was sent out for a standards association ballot and received 95% affirmative with 2 negatives. One negative was resolved but the negative of Mr. Jim Thompson could not be resolved.

A recirculation ballot was conducted which received 95% affirmative and 5 negatives to include Mr. Thompson's. Only 75% affirmative is required. Mr. Thompson delivered a 15 minute Power Point presentation to show his reasoning for his vote. The comments and negatives were discussed. The choices for action were: to send the document for RevCom approval; to make changes and rebalot; or to reaffirm the 1991 Document. Since the original PAR was obtained in 1996 had has been extended with an expiration of December of 2002 it was thought that another recirculation could not be completed in the time remaining.

A straw poll was taken as to how many wanted to send the document forward rather than reaffirm the old document. The chair approximated that 75% raised their hands in support of moving the new document forward.

To attempt to resolve the negatives the chair appointed Jim Thompson to chair a new WG to begin an immediate revision of the new document once it is published.

10.6.4 PC57.104 – Guide for the Interpretation of Gases Generated in Oil – Immersed Transformers

This WG is chaired by Frank Heinrichs and the document is out for a standards association ballot that closes May 24, 2002.

10.6.5 PC57.130 – Trial Use Guide for the Dissolved Gas Analysis During Factory Thermal Tests for the Evaluation of Oil Immersed Transformers and Reactors.

This group is chaired by Frank Heinrichs. The work was completed a long time ago with Draft 13. The PAR has expired. With so much work done the subchair asked for a volunteer to contact Frank and help get the PAR renewed and then recirculate the document for ballot. Jim Thomson volunteered to contact Frank to see what needs to be done.

10.6.6 PC57.111 – IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance on Transformers.

This guide needs to be reaffirmed. The chair requested a volunteer to determine whether the standard should be reaffirmed or revised. Ken Haggerty volunteered.

10.6.7 P IEEE 1258 – Trial Use Guide for the Interpretation of Gases Generated in Silicone Immersed Transformers.

Jim Goudie is chair of the document. The PAR is expired. The chair asked for a volunteer to contact Jim and see what needs to be done to rescue the document. Bill Bartly volunteered.

10.6.8 IEEE STD 637 – IEEE Guide for the Reclamation of Insulating Oil and Criteria for Its Use.

A volunteer was asked to head up an effort to reaffirm and then revise this guide. C57.106 needs to be approved as some of the values in the oil maintenance guide will then go into the reclamation guide. Jim Thompson volunteered to reaffirm to keep it alive and then start revision.

10.6.9 C57.121 – Guide for Acceptance and Maintenance of Less Flammable Hydrocarbon Fluid

This document was issued as a revision in 1998. It still has time before any action needs to be taken.

10.6.10 New Business

10.6.10.1 Bushing Failures

Mike Lau said they had two failures on 500kV bushings. Test results showed moisture and gas levels that were thought to be high but there is no guide for diagnosis.

IEC has a small section on this issue on STD 60599.

John Grimm indicated that IEC 61464 has values slightly different than 60599. Volunteers were requested to research the IEC standards and determine if there is a need for a new guide or whether we should adopt IEC standards.

There are practical problems. How do you get a sample and one should never sample energized bushings. Jurisdiction of an IEEE guide needs to be resolved. Is this a fluids issue or a bushing one. Fred Elliott of the bushing subcommittee supports this idea and the administrative subcommittee will determine which subcommittee will handle.

10.6.10.2 New Business - Other

Paper degradation is inferred from analysis of furanic compounds in oil. There is an ASTM (and IEC) method for the analysis of furans but there is no document to deal with diagnostics. A guide to do this was proposed by David Grant of Manitoba Hydro as he says he has a lot of data and experience.

The chair asked for a volunteer to contact David. J. Alan Forrest will follow this up.

IEC has some documents under revision.

IEC 60296 New Transformer Oil Specification is in CDV form and out for ballot.

IEC 60422 Guide for Acceptance and Maintenance of Oil is being revised.

IEC 60567 Standard for Sampling and Measuring Dissolved Gas Content in Oil is being revised.

There was no further business.

The next meeting will be in October 20th to 24th 2002 in Oklahoma City.

The subcommittee adjourned at 12:20 p. m.

Submitted by J. J. Kelly

10.7 Insulation Life SC – D. W. Platts, Chair

The Insulation Life Subcommittee met at 8:00 AM Wednesday, April 17, 2002 in Orlando.. Attendance was 25 members and 65 guests. The minutes of the October 17, 2001 meeting in Orlando, FL were approved.

10.7.1 Chair's Announcements

10.7.1.1 ADCOM meeting on Sunday.

All future ballots will be done as electronic ballots. Please make sure that the Standards Association has a current email address for you.

We discussed future meetings which will be: Fall 2002: Oct 20-24 – Oklahoma City, Oklahoma, Spring 2003: March 16-20 – Raleigh, North Carolina, Fall 2002: Tentatively Pittsburgh PA.

Again we discussed the request from IEEE that we coordinate our meetings with the annual PES meeting in order to promote wider participation by PES members in both our meetings and the activities of the General Meetings. We voted not to combine our spring 2004 meeting with the General PES Meeting in June 2004 in Denver.

Chairs of WGs and SCs need to establish Secretaries to their committees who can chair the meetings in the event that he or she can not attend for personal or professionally related reasons. This step is expected to avoid the problem canceling many meetings often at short notice.

Our next subcommittee meeting will be in Oklahoma City on Oct. 23, 2002.

10.7.2 Status Reports for active projects:

Subhash Tuli reported PC57.119; "Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Transformers at Loads beyond Nameplate Rating" has been published. Drafts of C57.12.00 and C57.12.90 will be out for ballot soon.

The loading guide, C57.91, has been balloted for reaffirmation, along with a corrigenda covering several errors that have been found in the printed document. The electronic version of the guide contains several errors produced during the scanning process. It must be revised to clean up those errors.

10.7.3 Working Group reports were as follows:

10.7.3.1 Working Group on Loading of Liquid Immersed Transformer - Linden Pierce, Chair.

The Working Group met from 9:30 am to 12:00 Monday, Apr. 15, 2002 with 23 members and 63 guests in attendance. The minutes of the Oct. 15, 2001 meeting in Orlando, Florida were approved.

After introductions of members of guests, the following new members of the Working Group were recognized: Joe Foldi, John Lackey, Andre Lux, Steven Schappell, Manual Silvestre, Brian Sparling, Malcolm Thaden, and Alan Wilson.

Draft 2 of a revision of C57.91, "Guide for Loading of Liquid Immersed Transformers and Voltage Regulators" was sent to the Working Group and the Insulation Life SC members by E mail on April 3. Changes made as a result of comments received on Draft 1 were reviewed and summarized as follows:

Copyright Statement

A new copyright statement was required by IEEE. Major change is that IEC is not given prior permission to reproduce the draft. Permission must be requested from IEEE.

1.1 Scope

The scope was revised as follows to better accommodate transformers with different temperature rise ratings:

"This guide provides recommendations for loading liquid-immersed transformers and voltage regulators with insulation systems rated for a 110 °C winding hottest spot temperature at rated load. This guide applies to transformers manufactured in accordance with IEEE C57.12.00 and tested in accordance with IEEE C57.12.90, and voltage regulators manufactured and tested in accordance with C57.15.

Because a substantial population of transformers and voltage regulators with insulation systems rated for 95 °C winding hottest spot temperature at rated load are still in service, recommendations that are specific to this equipment are also included."

3. Definitions

"Directed flow" and "non-directed flow" were removed because they are defined elsewhere and in other IEEE standards. "Loss-of-Life" was added.

4. Nomenclature

This was updated. Major change was to define Load L as "per unit load current".

5.2 Load Current, voltage, core excitation, and frequency

This was rewritten to better explain the effect of these parameters on transformer temperatures.

Clause 5.2.1 was expanded to cover rating information in C57.12.00. In draft 1, "load" was not defined. It could be either KVA or Current per C57.12.80. It is current that causes winding heating and maximum currents are given on the nameplate. To stay within the manufacturers ratings, both KVA or maximum current must not be exceeded. Draft 2 defines "load L" as "per unit load current".

7.3 Determination of equation parameters

This subclause was added to discuss the determination of the variables used in the equation to predict the bubble evolution temperature. Some material from Annex Clause E.4 was moved to this subclause. The addition of curves was requested. T. V. Oommen will supply in TIFF format.

8. Ambient temperature

This clause was rewritten to reflect the current state of the art. The use of a 5 °C margin was removed. The words "to be used" will be changed to "recommended".

10.4.1 Exponents

The following sentences were added. "If more precise values are known from testing, they may be used. IEEE C57.119 provides a test procedure for determination of the exponents."

11.3.3 & 12.3.4 Loading based on tested average winding temperature rise

This was rewritten to eliminate the use of a 5 °C margin from tested average winding temperature before calculating the loading capability based on actual ambient temperature.

13.2.1 Bushings, general

A sentence was added to contact the transformer or bushing manufacturer to obtain the bushing constants needed for the bushing loading calculations.

14.4.3 Operation of ODAF transformers without pumps in operation

Clause H4.2 in C57.91-1995 was not retained in the present draft. The following paragraph was added as a caution.

"Operation of directed flow transformers with the pumps in operation is very risky. Without the pumps in operation, the transformer operates in a natural convection cooling mode. Restrictions within the forced oil heat exchanger, and by the pump impellers may prevent natural convection flow. The winding duct oil temperature may quickly reach a very high value for this mode of operation. No guidelines can be given because only the transformer manufacturer has the detailed information to evaluate this mode of operation. If information is desired, the transformer manufacturer should be contacted for recommendations."

A question was raised about triple rated units. This is covered in Clause 14.3.

16.4 Cold load pick up, Other considerations

The statement, "If prior loading cannot be controlled by demand or rate of increase, the windings may experience localized hot spots and accelerated aging of conductor insulation during cold weather ambients", was changed to, "Loading should be controlled by demand or rate of increase to limit the winding hottest spot temperature to acceptable values".

Clause F.3.3.2 and Table F.1 References for cold start up and low ambient temperature operation

References to other investigations by Northrup and Thompson and Lampe were removed from the table and a paragraph describing these investigations was deleted. They references were deemed to not be useful.

Clause 6. Insulation Life. Also B.2 and D.3

This was rewritten based on a suggestion by Glen Swift to simplify the material. Material about "per unit life" which was not used in the calculations was deleted.

Clause 10.1 General and Clause 10.9, Approximation Method D.

At the last meeting some members expressed a desire for less complex loading equations.

An approximation method suitable for hand calculator use was included as Clause 10.9. An example calculation was provided. It is not the intent that simple equations be computerized for complex loading situations. If equations are computerized, then the most accurate forms described as methods A, B, or C should be used.

Clause 10.1 was expanded to describe the different calculation methods:

There was much discussion about the calculation methods. H. Nordman indicated his data with fiber optic detectors supported the Method A (Old Annex G) approach. He has developed an alternate method with "thermal overshoot" for inclusion in the IEC Loading Guide. Linden Pierce presented transparencies illustrating that the two methods predict similar results.

Don Platts expressed a concern that the new approach would require recalculation and rerating of transformers if the new methods are used as compared with ratings derived from the old Clause 7 equations which have been used for many years. Donald Chu responded that there are advantages to the new equations which give increased load capability for many units and thus resulted in cost savings. Increasing the temperature limits was stated as a possibility.

There was a discussion to include winding time constants in Method D.

Open Issues for Next Draft:

Additional Examples

It is planned to include example calculations in the next draft showing calculations for loading capability based on ambient, over or under excitation, and MVA load calculations from per unit load current.

Computer Code

When the present BASIC language code was developed in 1992, all PC's could run BASIC language programs under DOS. Present personal computers do not have this capability. Alternatives under review include providing program listings in BASIC, FORTRAN, and C language. All these languages are documented in ANSI standards. Tim Raymond provided the Chair with a listing of the BASIC program converted to C language. If feasible, a disc will be provided with the program listings and also a simple exe file would be provided to do the calculations.

Input files could be created using a spreadsheet program. The program would read these files, perform the calculations, and write the results to a text file that could be read by a spreadsheet program. The user could then manipulate the data and plot curves as desired.

Some spreadsheet programs allow the use of BASIC code as a MACRO to perform computer calculations using the spreadsheet data. It is hoped that software developers could use the computer code listings to develop enhanced commercial programs at a low cost. This issue is open.

Submitted by Linden W. Pierce, Chair

Don Platts read the report for Linden who could not attend. He urged members and guests of the Subcommittee to become involved in the Working Group's efforts. He noted that the focus seems to have shifted and that it is now aimed toward manufacturers to meet contractual agreements for loading capability, and it may no longer be targeted for users. He also noted that distribution transformer users cannot use this guide without requesting 12 data items from the manufacturer, and that their input would be helpful.

10.7.3.2 Working Group on Definition of Thermal Duplicate - Barry Beaster, Chair.

The Working Group did not meet. Their draft document is with IEEE for balloting.

10.7.3.3 Task Force on Winding Temperature Indicators - Phil McClure, Chair

The meeting convened April 16, 2002 at 1:45 PM. Three members and 19 guests were present. Two guests requested membership. The members and guests introduced themselves and the minutes of the Fall, 2001 meeting in Orlando were approved.

Draft two of the technical paper was e-mailed to members last week and copies were made available to the attendees. This draft had the introduction and detailed outlines for transformer manufacturer's and user's perspectives on winding temperature added. Since there were only 3 members present, the new sections were not discussed in detail. A poll of the group revealed that there were 12 or less persons present who were associated with field or factory winding temperature measurement issues.

Volunteers were sought to help write one or more topics from the outline and several offered. There is a need for more input from both users and transformer manufacturers. The members of record and guests who have expressed interest in the past will be contacted and asked to participate respective to their occupations.

A thermal response curve was presented as an example of the type of data we would like to present with the paper, to illustrate particular instances of winding temperature indicator response. Two persons offered to provide heat run data which would produce similar curves. At the last meeting several transformer manufacturers offered data, but the issue was not pursued in the interval between meetings. It will be addressed before the next meeting in Oklahoma City.

The chair expressed a desire to complete the work on the paper in time for the meeting in Spring 2003. A suggestion that the work culminate in a tutorial session was made and accepted by a majority the group. The members will be polled to determine if there are any objections to that approach.

No new business was presented. The meeting adjourned at 2:30 PM.

Respectfully, Phil McClure, Chair

10.7.3.4 Task Force on Temperature Rise Clause 5 C57.12.00- Dennis Marlow, Chair

The Task Force met on Tuesday, April 16 2002 at 11:00 AM. There were 34 members and guests in attendance. Dennis Marlow could not attend, so Don Platts and Juan Castellanos led the discussion of the open items.

The minutes of the previous meeting were included in the Subcommittee minutes, and were approved.

The task force was formed to make recommendations to the Insulation Life SC concerning the 2 proposals for temperature rise changes to C57.12.00 clause 5, submitted by Dennis Marlow at the Amsterdam meeting in April 2001.

Although the group demonstrated that there is no overwhelming support for either of these proposals, the group refrained from recommending that the work be halted. We will allow Dennis to chair another meeting to pursue the topics and discussion items.

Proposal 1 dealt with changes to the average temperature rise for ODAF cooling from 65°C to 70°C. Comments made during the meeting:

There is no real experience from manufacturers, even in Canada, because the majority of specifications request 65°C rise average winding rise. Also it is usually the hot spot rise that limits the design rather than the average winding rise.

If adopted, the temperature reference for losses will need to be changed from 85°C to 90°C for 70°C ODAF units.

What is the user's benefit if applying the proposal? We need to provide more justification.

There is an economic benefit, in reducing the number of coolers required for a unit; mainly for those with hot spot rise factors of 1.3 or less.

There is a conflicting opinion of the value of pumped cooling. While manufacturers use ODAF cooling to meet shipping requirements, many users are specifying units be built without pumps to avoid the maintenance problems associated with them.

Is the production of ODAF units a large enough proportion of the market to justify making an exception for them?

Further discussion is required. The meeting will be continued in Oklahoma City. Working mainly on the benefits the proposal will offer if included as part of the standard.

Proposal 2 dealt with changes to the average temperature rise of two windings that were located one above the each other.

This is a similar to a series-parallel low voltage winding application. From that point of view, the average can be used.

It is recognized that potential economic benefits are present from this proposal, savings in cooling equipment for a 5 to 10 °C average oil rise increase.

In rectifier transformers, there are several windings axially located, and the average winding rise is taken as the average of all, as long as the hot spot rise is met.

A change in the proposal was suggested, use the words "same winding design" instead of same KVA

Updated proposals will be issued to members and attendees prior to the next meeting.

NEW BUSINESS - There was no new business

The meeting adjourned at 12:15.

Respectfully submitted, Donald Platts - For Dennis Marlow Task Force Chair,

10.7.4 Old Business

10.7.4.1 IEEE1276

IEEE Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers, IEEE 1276, will also reach its 5 year life in 2002. Mike Franchek has agreed to review the document and either recommend revision, or begin the reaffirmation process.

10.7.4.2 Resistance Correction Factors

The chair summarized efforts to survey for Resistance Correction Factors and procedures for determining cooling curve data. It was started as a suggestion to standardize the procedures for calculations of the heat run data. Some of that work was attempted during work by the Working Group to revise the Temperature test code, but was abandoned. In Orlando, we reviewed the requirements in 57.12.90 that say the tester should use a curve fitting program or draw a smooth curve through the data points to determine resistance at time zero. We agreed that the subcommittee should survey manufacturers to determine if there were significant differences between them. This survey provided data from 3 units and asked for the resistance at time zero.

So far, we have only 6 responses, so the data set is too small to evaluate properly. There are no conclusions from the limited input on the distribution units. The limited information on the power transformers showed only a small deviation between responses, about .6 degrees C.

The chair offered to resubmit the survey to manufacturers in the subcommittee asking them to evaluate cooling curve data, and report the resistance at time zero that would result from using their standard techniques. George Henry has agreed to lead a new task force to resume work on the test code to incorporate additional changes as they are identified.

10.7.5 New Business

There was no new business. The meeting adjourned at 9:20 AM.

Respectfully submitted by Donald W. Platts, Chair Insulation Life Subcommittee

10.8 Performance Characteristics SC – R. S. Girgis, Chair

10.8.1 Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 11:00 A.M. on Wednesday, April 17th with 61 members and 49 guests in attendance. 19 of those guests requested membership in PCS. All members and guests were requested to provide e-mail addresses, as e-mail will be the primary means of communication of PCS minutes and other documentation.

10.8.2 Approval of Meeting Minutes

The minutes of the October 17, 2001, PCS Meeting in Orlando, Florida were approved as written.

10.8.3 Chairman's Remarks

10.8.3.1 Administrative Subcommittee Notes

- 1) Next meeting dates and locations are as follows: Fall 2002: Oct 20-24 – Oklahoma City, Oklahoma, and Spring 2003: March 16-20 – Raleigh, North Carolina. It is planned that the Spring meeting will have some coordination with the Switchgear Committee. Hence, relevant tutorials dealing with switchgear and transformers will be planned. For instance, one by the WG on, “ Switching Transients“. Further details included with Committee Minutes. Potential hosts for future meetings should contact Greg Anderson (gwanderson@ieee.org).
- 2) The Adm SC discussed and voted against combining the spring 2004 Transformer Technical Committee meeting with the General PES Meeting in June 2004 in Denver. This was originally a request from PES as part of an effort to promote greater interaction and exchange of ideas between Committees.
- 3) Minutes of the Orlando meeting are available on the IEEE Committee Web Site
- 4) Chairmen of WGs and SCs should draft Secretaries to their committees who can chair the meetings on their behalf when they could not attend for personal or professionally related reasons. This will also avoid canceling such meetings.
- 5) Each WG and TF chairman will need to check the status of the Par of the document worked on.
- 6) Chairmen of PCS, “ Insulation Life “ SC, and “ Insulation Liquids “ SC should decide which SC should take on the Core Hot Spot Standards Issue.
- 7) Dielectric Test SC will have a Liaison in the FRA testing WG to be formed as part of PCS.
- 8) One of the tutorials planned for future Committee meetings will deal with Emerging Technologies related to Transformers
- 9) SC Chairs will submit to Bipin Patel their evaluations of IEEE Papers belonging to their SC’s technical scope. He will then submit to IEEE the Committee’s nomination of prize papers.
- 10) IEEE suggested that figures in the proposed “ Guide for Short Circuit Testing “, C57.133 are of poor quality and would need to be improved. Nigel will work with an IEEE representative on this issue.

Note: Individuals who wish to receive invitations to ballots on IEEE Standards have the responsibility to make sure their correct e-mail address is on file with IEEE. Status can be checked on the following website, or adjacent related websites: <http://standards.ieee.org/db/balloting/ballotform.html>

10.8.3.2 Membership

19 new members asked for membership and were added to the PCS Roster:

David Barnard, Weidmann Systems International

Steve Beckman, Black & Veatch

Enrique Betancourt, Prolec GE

Larry Davis, Reuel Inc.

Tom Harbaugh, Pennsylvania Transformer Technologies

Bob Hartgrove, CP&L / Progress Energy
Thang Hochank, Hydro Quebec – IREQ
John Holland, Pauwels Canada
Tim Huff, Kuhlman Electric
Boyd Leuenberger, US Bureau of Reclamation
Triomphant Ngnegueu, VA Tech JST
Klaus Papp, Trench
Tommy Spitzer, Oncor
Andy Steineman, Delta Star
Charles Sweetser, Doble Engineering
Robert Thompson, Duke Energy
Katsutoshi Toda, Toshiba
Roger Verdolin, GE Energy Services
May Wang, Powertech Labs

The Membership roster will be reviewed, and members who have not attended any of the last 4 meetings will be contacted regarding their removal from the PCS roster; thanking them for past participation, and indicating that with renewal of participation they will be welcome to rejoin the group.

10.8.3.3 PCS Secretary

The chairman announced that Steve Antosz accepted the responsibility to become the secretary of the Performance Characteristics Subcommittee. The attendees applauded the announcement.

10.8.4 Agenda Changes - None

10.8.5 Working Group Reports

10.8.5.1 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 Vancouver, B.C., Canada on April 15, 2002 at 11:00 A.M. There were 76 persons in attendance, 24 members, and 52 guests. 21 guests requested membership in the working group.

The minutes from the last meeting were reviewed and accepted as written. The Agenda for this meeting was then reviewed and no changes were requested. The Chairman requested a volunteer to serve as Secretary. Rowland James volunteered to serve in this position.

Discussion of outstanding issues

The chairman announced that a few agenda items from previous meetings were never properly addressed. These items have been added to the agenda of this meeting under “Old Business” and will remain on the agendas of future WG meetings until they are addressed.

Sponsors of requests for changes to clauses 12.4.5, 12.5.4 and 9.3.3.2 made at the Niagara meeting will be contacted for justification of these requests.

A write-up for test techniques for “Dissolved Gas in Oil Analysis” (previously missing) was re-submitted for consideration.

A list of proposed changes to C57.12.90 with justifications that was previously submitted to the chairman of this working group by Steve Beckman will be forwarded to Subhash Tuli, working group chairman for revisions to C57.12.90 under the Standards Subcommittee for distribution to the appropriate subcommittees and working groups.

Old Business

Working group items 8 through 12 were placed on the agenda for discussion and resolution. Item 8 was discussed at length. This item addresses operational testing of all devices operated from the control cabinet.

Section 3 addresses devices such as fans, pumps, motors, coolers, etc. This section will be reworded and circulated for comments.

Section 4 addresses electronic devices such as gas detection systems, electronic temperature monitors, etc. The word calibration was removed from the second to last sentence and the last sentence, concerning individual calibration of devices, was removed.

Sections 5 and 6 were deleted.

Section 9, “Operational Tests of Load Tap Changers”, will be discussed at the next meeting.

Item 10 addressed “Core Insulation Resistance Measurements”. Discussions of temperature measurement and correction factor as it applies to core insulation resistance measurements involved both core and shell form transformers. Since this test is considered to be a factory measurement, it was decided that the measurement is applicable to both core and shell form transformers. Since temperature correction, in this case is not considered to be a significant issue the last sentence that stated : “There is no temperature correction applicable to this measured value” was removed. The proposed wording was accepted as corrected by the working group.

Due to a lack of time, items 11 and 12 were tabled for the next meeting.

The meeting was adjourned at 12:20 P.M.

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

The Working Group met on Monday, April 15 at 1:45 PM. There were 23 members and 28 guests in attendance. The following 2 guests requested membership, and are welcomed into the Working Group, bringing the total membership to 56 members:

Ramsis Girgis	ABB Power T & D
Ed teNyenhuis	ABB Power T & D

Following introductions, the minutes from the October 15 Orlando meeting were approved as submitted.

The chairman reported that the roster had recently been reviewed, and 8 members were contacted and subsequently removed from the roster due to inactivity.

Subhash Tuli reported that the next revision of C57.12.00 has been submitted to the Standards Department for invitation to ballot. This will be sent out electronically very soon, with a goal of completion by the autumn Oklahoma meeting.

The Working Group then began discussing the topics of old business, as follows:

WG item 38: Request to add the requirement for instruction manuals. Using CAN / CSA-C88-M90 as a reference, considerable discussion ultimately led to the conclusion that instruction manual requirements should be placed into the applicable product standards and that no notes or references were necessary in C57.12.00. This item will be referred to the subcommittee chairmen of the product standards.

WG item 39: Request that a designation be developed to address “Future” ratings. Again there was considerable discussion concerning this request, covering not just how to designate a “Future” rating, but all the many technical issues associated with it. In the final analysis, the WG felt that “Future” ratings should NOT be addressed in the standards, and that this practice should be left treated as an exception to the standards, as it is today.

WG item 40: Request to add acceptance criteria and descriptions for the various tests that were added into Table 19 of C57.12.00, 2000 revision.

Core insulation resistance: Upon starting this discussion, it was pointed out that this issue properly belongs in the Dielectric Tests committee, so it will be forwarded on to that committee.

Single-phase excitation test: It was decided to delay this discussion until the C57.12.90 Working Group has addressed it.

Low frequency test on auxiliary circuits: This item belongs to the Dielectric Tests Sub -Committee.

Control (auxiliary) cooling losses: The WG agreed to modify the existing note 9 to Table 17, to remove the words “coolers, heaters, LTC drive motor, lamps, and all other devices operated from the fan

control box”, such that the proposed note 9 will read as follows: “Power consumption (auxiliary / cooling) losses associated with fans and pumps shall be measured on all Class 2 transformers.”

Due to time constraints, the remaining items could not be addressed during the meeting, so the outstanding topics will be discussed at the next meeting.

The meeting adjourned at 3:00 PM.

10.8.5.3 DETC Specification and Test – Phil Hopkinson, Chairman; John Gauthier, Secretary

The WG met on Monday, April 15th with 28 members and 34 guests present.

The chairman reviewed the mission of the WG, which is to develop a standard for de-energized tap-changers.

The chairman noted that IEC TC 14 WG has developed a document that includes all of the essential elements of a DETC standard except the functional life test.

Test results on various contact parts were reviewed. Silver filled contacts were shown to be an effective solution. Corroborating statements came from 2 members.

Where to go from here?

- In a show of hands, 25 to 9 voted to include the functional life test in the DETC document.
- Hans Schellhase of Powertech Labs indicated that a BC Hydro / EPRI paper is being prepared. The chairman would like a script explanation to assist with the preparation of a technical paper on DETC. This is an important component for explaining the purpose of the functional life test.
- The DETC document will be submitted to the C57.131 WG for consolidation.

In the meeting of the PCS, the chairman of the PCS commented that other functional life tests used by major manufacturers of tap-changers should be evaluated before a specific functional life test(s) is /are selected to be included in the proposed IEEE specification/ test document.

New Business

The chairman noted that Square-D Company no longer manufactures liquid-filled transformers. He desires to see the document completed so that he can disengage from this chairmanship without dropping the ball. The attendees of the WG meeting and the chairman of the PCS appreciated Phil's position.

The meeting adjourned at 4:35 PM.

10.8.5.4 Switching Transients Induced by Transformer / Breaker Interaction, PC57.142 - Bob Degeneff, Chairman; Peter Balma, Secretary

The Working Group was called to order at 8:00 AM on April 16, 2002. There were 45 attendees, 27 members and 15 guests; 3 requesting membership. The agenda for the meeting was reviewed, and the approval of the Minutes from the October 16, 2001, meeting in Orlando, Florida was deferred to next meeting due to difficulties with the distribution of minutes.

- 1) Draft 1.4 of the guide was, and will be, distributed by e-mail to all working group members. The only major section left to be completed is on circuit breaker characteristics. The guide will also be arranged to place more of the technical content into the annexes.
- 2) To assist in completion of the guide a special meeting with IEEE Switchgear and NEMA committee members has been suggested. An effort will be made to hold this meeting in the next six weeks and to reach consensus on this topic. The group will then jointly write the remaining sections of this guide.
- 3) The next item discussed considered whose responsibility is it to look at this potential problem and suggest remedies. Is it the transformer manufacturer, breaker designer, the design engineer, or the end user? Although there was excellent dialogue on this subject, consensus was not reached.
- 4) Nigel McQuin made a short presentation relative to the circuit breakers role in switching transients resulting from transformer breaker interactions.
 - He noted that ANSI C37.010 and the C37.011 (TRV) both highlight this problem and provide insight into its solution.
 - He further stressed this is a circuit phenomenon, rather than a breaker-transformer problem, and that the result is imposed on all equipment on the low side of the breaker.
 - There was significant interchange and dialogue on this topic. The key point in contention was that the characteristics of more modern breakers had the potential to stimulate circuit transients more than in the past.
 - There was also general agreement that the use of snubber circuits could resolve the problem. Furthermore, it was suggested to match the snubber impedance to that of the circuit placed on for the best results.
- 5) The CIGRE Joint working group in this area consists of members from Study Committees 12, 13 and 23.21. They have asked our working group to present a summary of the efforts that have been completed to date, at their upcoming meeting in Paris, August 2002. The CIGRE group is also working to assemble examples of this phenomenon, and expressed concern that the large number of unexplained transformer failures may well be the result of Transformer breaker interactions.
- 6) The current draft of the guide will be submitted to IEEE editors for review prior to our next meeting and, if time permits, their comments will be incorporated into the next draft.

- 7) Anticipate that at the Spring 2003 meeting in Raleigh (March 16-20) there will be a tutorial in this general area.

The meeting adjourned at 9:15 AM.

10.8.5.5 Loss Tolerance and Measurement - Ed teNyenhuis, Chairman

10 members and 19 guests attended, with 5 guests requesting membership.

Ed teNyenhuis, formerly the WG secretary, now has the chairman position of the WG. Dr. Ramsis Girgis, now the Performance Characteristics SC chairman, was thanked for his years of service as WG chairman.

Minutes from the Orlando meeting, Oct 16, 2001, were read and approved.

Dr. Eddy So reported on the TF meeting for “Guide of Low Power Factor Power Measurements”

- There were 22 attendees
- The complete draft guide was circulated for review. More comments were requested.
- Received comments on the guide were discussed which included:
 - Editorial
 - High frequency Q measurements of air core reactors should be included
 - Examples were difficult to follow
- An issue was raised of a case where using a single phase bridge to measure losses of a 3 phase shunt reactor one phase at a time caused the winding temperature to increase and hence the measured load loss to be somewhat different between phases. Dr. Eddy So and others will look into this issue.
- Another issue was raised which had to do with measuring different values of load losses between the phases. Again, Dr. Eddy So and others will look into this issue.

C57.123 Loss Measurement Guide

- The balloting for Draft 8 re-circulation closed on Jan 9, 2002. 131 returns were received out of 146 total ballots. Out of the 131, 127 were affirmative, 0 were negative, and 4 were abstention. This ballot was a 100% affirmation.
- Draft 8 was also balloted by the Accredited Standards Committee, which closed on Feb 1, 2002. 21 returns were received out of 26 total ballots. Out of the 21, 15 were affirmative, 0 were negative and 6 were abstention. This ballot was a 100% affirmation.
- Additionally, SCC10, SCC14 and the IEEE Editorial staff reviewed Draft 8 of the Guide.
- The Chairman has sent the Guide to the Review Committee for the upcoming June meeting to be considered as a new Guide.

Frequency Conversion Factors of Transformer Performance Parameters

- The purpose of such factors was reviewed. Transformers are normally tested at the frequency at

which the unit will be in service. However, suppliers for the US & other 60 Hz markets may only have 50Hz test facilities, in which case the only option is to test at 50Hz and use a conversion factor. Presently, a wide range of conversion factors is in use and there is not a standard set of factors. About 3 years ago, users requested that such a standard set of conversion factors be developed.

- The WG reviewed a paper that summarized investigations done and measurements performed to develop these 50 to 60 Hz frequency conversion factors. This paper showed analytical work and supporting measurements for conversion factors for no load loss, exciting current, load loss, and noise level.
- The WG agreed on the development of the factors and agreed on the developed factors for no load loss, exciting current, and noise level. It was decided by the WG that there is a need to do further investigation on the load loss factors. For the next meeting, stray loss factors for transformers with aluminum tank wall shielding will be calculated and two transformer manufacturers (Alan Darwin & Kevin Newman) agreed to provide measured 50 / 60 Hz load loss data for further verification.
- The WG agreed that the conversion factors should be inserted into C57.12.90 provided that it is emphasized that 1) Testing at 60 Hz is the preferred method, and 2) These are suggested conversion factor values to be agreed upon with the customer at the time of quotation.
- Proposed text for the conversion factors will be prepared for the next meeting.
- Several WG members requested copies of the paper, which will be sent to the WG members & guests once the paper is accepted for IEEE Transactions.

The meeting was adjourned at 12.15 PM.

10.8.5.6 TF on Frequency Response Test Standard/Guide – Chaired and reported on by Ramsis Girgis

Both a Tutorial and a planning meeting were held where different aspects of this subject were presented and discussed. After an excellent discussion, the group recognized the need for developing an FRA Guide and voted in favour of forming the TF. Members of the TF were selected to include representatives from transformer manufacturers, Users, FRA specialists, EPRI, CIGRE, and a specialist who is familiar with the use of FRA in rotating machines for a number of years. The size of the TF is now 12 and is intentionally kept small to ensure the focus of the TF members on the development of the material of the Guide. Rowland James kindly accepted the Chairman's request to assume the Chairmanship of the TF.

10.8.6 Project Reports

10.8.6.1 Status of C57.133 - Guide for Short Circuit Testing - Nigel McQuin, Chairman

The working group did not meet in Vancouver.

There is agreement in principle on the resolution of the negative ballot on this document, which will be appropriately confirmed in writing for the record.

The IEEE editorial staff is reconsidering their decision to deny publication of this document in its present form, based on the condition of certain longstanding figures. The copyrighted masters of these figures held by IEEE, are to be reviewed to allow the establishment of this document as a stand alone standard to proceed.

At this point it is not expected that a re-ballot will be necessary, so with the cooperation of the IEEE editorial staff, it is expected that this standard will be complete before the Oklahoma meeting.

10.8.6.2 Status of Revision of C57.110-1998 - IEEE Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents – Rick Marek, Chairman

Four years after printing, IEEE received a letter pointing out several mathematical errors in three tables of the document. An investigation indicated that they were indeed errors that should be corrected. However, the nature of the errors is rather trivial, since they occur in the third and fourth decimal places in tables that are used as illustrations and are merely examples of typical calculations. IEEE was requested to determine if this correction was editorial or technical. Noelle Humenick of IEEE indicated that she would send me a copy of the final balloted draft for my review. If the draft is different from the printed copy, IEEE will issue an errata sheet for the correction as an editorial error. Otherwise, the correction must be balloted as a technical change.

If the draft and printed copies are same, Noelle indicated that she would confer with her manager to determine if this correction could be ruled editorial due to the trivial nature and the fact that no real change in content would occur. If this fails, the chairman will issue a corrigenda ballot to correct the errors.

10.8.6.3 Status of Reaffirmation Ballot of C57.21, 1990 (R1995) - Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500Kva – Peter Balma, Chairman

Overview

- Invitation to ballot June 5, 2001
- Original paper ballot due September 10, 2001
- Ballot cancelled August 30, 2001
- Document conversion difficulties
- Document edited several times, ready to go again, December 2001
- New paper ballot distributed, due March 2001
- Reminders to all in early March
- Ballot closed March 25, 2002

Ballot Results

- 78 in eligible Ballot Group
- 53 Affirmative votes
- 5 Negative votes
- 2 Abstention votes
- 60 Votes = 76 % Returned
- 53 Votes = 91 % Affirmative

Negative Comments

- 1) Table 4A establishes the low frequency Overvoltage Test as a routine test for oil immersed shunt reactors.
 - 9.1.3.1 “consist of a one-hour low frequency test from Table 5A, column 5. This voltage shall be applied across the winding with the neutral solidly grounded. Partial discharge measurements shall be made during the one hour test.”
 - How to test delta connected reactor
 - PD testing of units under 115 kV, usually 15 kV class, unnecessary
 - Difficult to have test facilities for such tests
 - Suggest use IEC 289(2) Reactors Clause
 - Turn-to-turn testing allowed as alternative to dry-type, but not for oil immersed.
- 2) Numerous editorial comments
- 3) Numerous editorial, also, Technical
 - In the column of Table 5B, the s. surge of dry-type reactors is indicated as 460 kV, which corresponds to 83% of the BIL (550kV). This value is too high because 83% ratio is only applicable to oil immersed equipment. The corrected ratio for dry-type equipment is 70 –75% of the BIL. The 460 kV value should be corrected.
 - 10.5.2 should read ...be tested at 105% rated voltage
 - 10.5.10 should read.... be time spaced to assure accurate..
 - Use of 100 and 105% relative to both voltage & frequency in 10.6.3.3, 10.6.3.4, and 10.6.5.6
 - 10.3.5 vs. 10.3.5.5 contradictory on order of chopped, front of wave, and reduced full wave tests
 - Footnote 15, third term of equation is incorrect
 - 10.3.9.2.2 wave shape 500 vs. 1000 usec preferred by IEC
 - Standard is limited to 60 Hz should use power frequency
 - Clarity of 10.3.8.2, 2) Failure of gap to flashover.

Next Steps

- Clarity of what constitutes editorial corrections?
- Resolution of negative ballots?

10.8.6.4 Tutorials – FRA and 50/60 Frequency Conversion factors – Ramsis Girgis

The FRA tutorial explained the details and examples of the Sweep Frequency method and a new enhanced impulse method. The attendance was over 130.

The Tutorial on the “ 50 / 60 Hertz frequency Conversion Factors “ explained the details of the development. One of the SC members who earlier was not supporting including such conversion factors in C57.12.90 expressed at the SC meeting that after getting a better understanding of this development that he is changing his stand on the issue and is supporting it.

10.8.7 Old Business

Don Fallon spoke of a letter received from the Switchgear Committee on TRV for transformer limited faults and that they are looking for test data from OEM's. He would also like to establish a liaison.

A volunteer is needed to attend the WG on web page development as a PCS representative of PCS. See the PCS Chairman.

Time expired and the meeting was adjourned at 12:15 P.M.

10.8.8 New Business - No new business was brought up in the meeting

10.8.9 Next Meeting –

The next meeting is scheduled for October 23, 2002, in Oklahoma City.

Submitted by: Steve Antosz, Secretary

10.9 Power Transformers – E. G. Hager, Chair (Presented by Joe Watson, Secretary)

The Power Transformers Subcommittee met at 9:30 am on Wednesday, April 17, 2002 with 39 members and 73 guests. The minutes from the previous meeting in Orlando were approved.

10.9.1 Working Group and Task Force Reports

10.9.1.1 Working Group for revision of C57.12.10, Liquid Immersed Power Transformers - Javier Arteaga Chairman:

Javier Arteaga reported that the Working Group met at 9:30 am on Monday, April 15, 2002. There were 28 people in attendance, 10 members and 18 guests with 2 guests requesting membership. This will bring the total membership to 25 people.

Minutes from the meeting held in Orlando were distributed, reviewed and approved.

Tom Provost provided a status update on the PAR. Just prior to the Vancouver meetings, a conference call was held to resolve the PAR approval problems associated with C57.12.10 and C57.12.36 (Liquid Immersed Distribution Substation Transformers).

The result of this conference call was to remove the lower end rating limits from the scope of C57.12.10. Instead, the definitions found in C57.12.80, for Power and Distribution Transformers, will be used as the framework for both C57.12.10 and C57.12.36.

These definitions are as follows:

Distribution Transformer. A transformer for transferring electrical energy from a primary distribution circuit to a secondary distribution circuit or consumer's service circuit.

Power Transformer. A transformer which transfers electric energy in any part of the circuit between the generator and the distribution primary circuits.

This change in scope will create a ratings overlap between the two standards, thus the user will need to select the applicable standard based on their application.

The PAR's for both C57.12.10 and C57.12.36 will be revised during these meetings. A preliminary copy of each PAR will be forwarded to NESCOM for review prior to their June meeting.

Regarding technical work:

Draft information has been submitted by John Rossetti for "Ratings," Jim Harlow for "LTC's," and Bob Hartgrove for "Construction."

This information will be the basis of a draft document that will be distributed by the end of May. Included in this draft will be an outline for the Table of Contents, along with a section on gauges previously provided by Phil McClure.

The various Tables for "Ratings," as they exist in the current version of C57.12.10, will be removed and a reference will be made to the Tables in C84 and C57.12.10.

Comments and suggestions from the last revision to this Standard will be reviewed and addressed.

The work being started on control cabinet standardization may be appropriate to eventually include in this standard.

The final technical item addressed was a brief discussion as to whether or not 25 Hz. Applications should be included. Since this would be a very small subset, it was decided to only include 50 and 60 Hz.

Next Actions:

1. Revise and Resubmit PAR
2. Develop a draft document
3. Distribute draft to all members and guests. This will also be submitted to the appropriate WG chairs in IEC, C37 and C62. Tom Prevost will help establish these contacts.

4. Recruit volunteers to provide input on specific sections of the document

With no additional business, the meeting adjourned.

10.9.1.2 Working Group on LTC Performance - William Henning, Chairman

Craig Colopy reported that the Working Group on Load Tap Changer Performance met on Monday, April 15th at 1:45 pm with 16 members and 24 guests attending, of which 7 requested membership. Minutes from the October 15, 2001, meeting in Orlando were approved with the exception of clarifying that the IEC 547 Application Guide is really IEC 542.

Progress with regard to WG26 of TC14 was presented. Final draft of IEC 60214-1, Tap Changers – Part 1: “Performance Requirements and Tests” has been approved by the TC14 Main Committee. Reactor on-load tap-changers and de-energized tap-changers have been included in this document. Copy of draft has been sent to members for reference. In an attempt to address life issues brought up by Phil Hopkinson with regard to the contacts of de-energized tap-changers, contact temperature-rise limits were lowered from 20°C to 15°C at 120% load (15°C to 11°C at 100% load). Routine tests of the de-energized tap changer were limited to a mechanical operational test and pressure/vacuum tests.

A Committee draft of IEC 60214-2: Tap Changers – Part 2: “Application Guide” has been submitted to TC14 Main Committee for comments. WG26 of TC14 will review comments in London, the second week of September. The comments will be reviewed further at the TC14 meeting in Rome, at the end of September. The US delegates to TC14, Craig Colopy and Tom Traub have also sent copy of this draft to the members of our Working Group on LTC Performance for review and with the purpose of obtaining comments for submittal.

This application guide will succeed the old IEC542 guide. This guide also includes reactor on-load tap-changers and de-energized tap-changers. This guide also attempts to address the contact-life of de-energized tap-changers. A reference is made to preferred contact materials and there is a recommendation that the tap-changer is operated periodically to clean the contacts.

An electronic ballot for the re-affirmation of IEEE C57.131, “Standard Requirements for Load Tap Changers” was conducted with three negative comments received. These negative comments will need to be addressed by the chairman and re-circulated through the Working Group before the Standard can be re-affirmed. These comments and the IEC TC14 Standard 60214-1 (Part 1) will be used for reference when C57.131 is to be revised. A PAR will be generated in the near future to start this work.

It was agreed by the members to delay work on an Application Guide until WG26 of TC14 has completed the work on their Guide. As was stated before, though, members will be solicited for comments during the generation and approval process for this IEC Application Guide.

This Application Guide has also made an attempt to address on-load tap-changer contact life, an issue brought up by Bill Henning and Jim Harlow at the meeting in Orlando. The Guide reinforces that the requirements for 500,000 operations in IEC 60214-1 is strictly mechanical. The number of operations

at rated load current is dependent on a number of variables and on maintenance and changing of worn contacts.

The meeting was adjourned at 2:45 pm.

10.9.1.3 Working Group on C57.143, Guide for the Application of On-Line Monitoring Equipment to Liquid Immersed Transformers – Donald Chu and Andre Lux Co-Chairmen

Donald Chu reported that the group did not meet during the Vancouver meeting. A Draft will be issued for a survey in the next 2 months. The PAR was approved in December, 2001, valid through December, 2005.

10.9.1.4 West Coast Working Group, C57.93 “Installation of Liquid-Filled Transformers,” Mike Lau, Chairman

The Working Group was called to order at 9:35 am on Tuesday, April 16, 2002. There were 57 attendees, 18 members, 11 requesting membership and 28 guests. The agenda for the meeting was reviewed, followed by approval of the minutes from the October 16, 2001 meeting in Orlando, Florida. The agenda, minutes, a new draft of the guide, and copies of the overheads presented were distributed.

1. A new PAR has been prepared and submitted. Approval is expected in June.
2. A summary of work efforts and discussions since the last meeting were presented. The presentation included additional input, comments, rewrites and discussion. Salient points discussed were as follows:
 - a. Energization under cold conditions
 - i. Discussions considered the effects of cold on the dielectric capability of the insulation system; loss of cooling due to the solidification of oil ($\approx -30^{\circ}\text{C}$); determination of actual oil temperatures; and some practices used by the utilities. Furthermore, it was suggested that no load energization might help but temperature, not time, would determine how long this might be necessary. Unfortunately, this does not address the dielectric issue.
 - ii. An excellent suggestion was made to use the guide to present the concerns and considerations for energization in extreme cold conditions, and that the user and manufacturer could then make the best decisions for a specific situation.
 - b. Hot air drying of insulation
 - i. The discussion on this method of drying was focused on methods to dry a transformer that cannot withstand vacuum. Suggestions included transport to a factory, untanking, and oven drying; a field constructed hot oil spray system; a hot gas system using nitrogen; and drying the windings through short-circuit currents. There was agreement that most field alternatives were time consuming and expensive, and that it might not be possible to lower moisture content to values typically accepted today.
 - c. Recirculation

- i. Concern for total dissolved gas content after recirculation was discussed. However, it was recognized that the type of oil preservation system utilized makes it difficult to establish a single guideline. In addition, requirements vary by manufacturer.
 - ii. It was suggested that the title of this clause be changed to "Reprocessing."
 - d. Internal inspection airflow
 - i. Caution was urged to not duplicate or supercede OSHA or other government regulations for safety.
 - ii. Many users indicated that the rules for enclosed/confined space were being followed.
 - iii. It was suggested an airflow of 20 cfm was required with an additional 5 cfm for each worker in the transformer.
3. Additional volunteers were requested to re-write several sections of the Guide. New volunteers were as follows:
 - a. Clause 3.9 & 4.13, Maintenance: M. Lau
 - b. Clause 4.1 & 4.2, General & Shipping: E. Schweiger
 - c. Bill Darovny, Dong Kim and Alan Peterson also indicated that they would participate in re-writing other parts of the Guide.
4. Under old business, as had been previously noted, it was suggested that a new section on dew point testing would be a valuable addition to this Guide.
5. Under new business, Paulette Payne, liason between IEEE and Doble for this Working Group, provided an update on Doble's progress on an oil processing guide. Draft 2 is to be issued in June. An area of concern they are working to resolve is the question as to how long to soak a transformer after processing and prior to energization. Doble would like the input from IEEE in this area.

A second item under new business was to consider increasing the content of the maintenance section relative to tap changers, for instance, whether filters for tap changers should be discussed.

The meeting adjourned at 10:35 am.

10.9.1.5 West Coast Working Group, Mike Lau – Chairman

Mike Lau reported that the Working Group met Monday, April 15th, 2002 at 11:00 am with 4 members and 16 guests attending.

The Chairman announced that due to lack of an active assignment, and unless there is appropriate work identified, the Working Group will be dissolved.

Surprisingly, a number of items were brought forward by the attendees. Items include seismic considerations for transformers, harmonic generation in wind turbine applications, security and special considerations when shipping to the west coast. After much discussion by the attendees and consultation with Jin Sim afterwards, it was agreed that a Users Guide on seismic considerations for transformers would be a worthwhile project for the West Coast WG. The following persons have indicated interest in participation: Ewald Schweiger, Stan Lindgren, Joe Watson, Craig Swinderman, Jim Neilson, Marcos Ferreira, Dong Kim, Bill Darovny and Marion Jaroszowski.

The meeting adjourned at 12:15 pm.

10.9.1.6 Working Group on C57.140 “Guide for the Evaluation and Reconditioning of Liquid Immersed Power Transformers” – Rowland James, Chairman

The Working Group met at 8:00 AM on Tuesday, April 16th, with 66 in attendance. There were 29 members and 33 guests -- 14 requested membership.

After introductions a brief discussion of the latest draft’s status was held. Authors of numerous sections were recognized by the Chairman for their contributions. Volunteers were solicited for the remaining sections.

We then opened the floor to input for the articles that have already been submitted.

- o Mr. Don Rose, Oncor offered a number of general comments and offered to send his input, electronically, to be included in the next draft.
- o Mr Don Platts, PPL, raised a concern about section 5.2 and the reference to possible hot spots in OFAF transformers. A general discussion ensued and it was agreed to alter this wording, or move it to another section.
- o A question was raised about the IEEE disclaimer ...whether there were different ones for “Guides” versus “Standards”. The Vice Chair agreed to check it out and make changes if necessary.

The meeting was adjourned at 9:10 AM.

10.9.1.7 Task Force on a Guide for Standard Control Cabinet Designs: Joe Watson - Chairman

Joe Watson reported that the Task Force met at 1:45 pm Tuesday, April 16, 2002 with 29 in attendance, comprised of 14 members, 5 guests requesting membership and 10 guests.

A set of control cabinet drawings from ABB, Pauwels, Kuhlman, Waukesha Electric and VA Tech Elin had been distributed by e-mail and additional copies were available at the meeting. The drawings were briefly discussed, but it was clear that the group needs to gain a consensus on common user requirements such as a functional schematic and basic cabinet requirements before proceeding further.

After lengthy discussions on the direction of the Guide, it was decided that a Survey should be taken before the next meeting to query users whether they have specific requirements on the following points:

- Wire type
- Wire size
 - o CT’s
 - o Controls
 - o Power
- Terminal blocks (sliding links, etc.)
- Crimp terminals (ring, spade, etc.)

- Terminal block orientation and layout
- Conduit entrances to cabinet
- Swing panels

The group also discussed the probable need for different designs for transformers with and without LTC's and variations based on the number of cooling groups.

Greg Anderson offered to prepare and issue the Survey with the Chairman. The survey should be issued by July 15th and the results will be distributed via e-mail to the group members before the next meeting where they will be discussed.

The group discussed the possibility of including this work in C57.12.10. The topic would fit within the scope of C57.12.10, but work can continue with this TF while the question is addressed.

The meeting adjourned at 2:50 pm.

10.9.1.8 Task Force on C57.17, Arc Furnace Transformers: Javier Arteaga – Acting Chairman

Javier Arteaga reported that the Task Force met for the first time on April 15, 2002 at 3:15 pm. In attendance were 19 persons and 11 requesting membership.

C57.17 was last revised in 1965, then reaffirmed in 1971. Subsequently, the Standard was withdrawn by ANSI/IEEE.

IEC has a standard for furnace transformers in effect. Frank D'Amico will give the chair the standard number, then the chair will request Tom Prevost copies of this standard for distribution among the TF members.

A general review of the existing 10 sections of the standard was made during the meeting in order to obtain general comments and have an overview of the changes needed, in order to include actual practices and harmonize with IEC.

The scope of the Standard was reviewed and found to be out of date. A new scope and content index will be prepared by the chair for discussion with TF members. Once the scope is defined, the proper PAR will be submitted for approval.

Some of the general items to include in a new Standard are:

- Oil immersed only
- Furnace transformers for DC and AC at 50 Hz and 60 Hz
- Rating up to 69 kV on the hV, a minimum of 2 MVA capacity with 65°C average winding rise, power transformer insulating levels (BIL) and cooling with oil pumps and water coolers
- No de-energized tap changer would be contemplated in the Standard
- Requirements for reactors, either installed inside the transformer tank or remotely, and requirements for transformers without reactors
- LV delta connection closed either inside the tank or externally

- Requirements for delta x wye reconnection on the HV
- Test requirements per ANSI C57.12.00, with further discussions on requirements for the temperature rise test.

The possibility to add guidelines for dissolved gas in oil levels in these types of units was discussed since it has been observed that the gas concentrations are different than in power transformers.

The meeting adjourned at 4:30 pm.

(Robert Veitch suggested in the SC meeting after the WG report that the WG should solicit members from companies that design and manufacture furnace transformers.)

10.9.1.9 IEEE Substation Committee Working Group for IEEE 693, the Substation Seismic Guide: Everett Hager - Liason

Everett Hager also reported that the WG for IEEE 693, the Substation Seismic Guide will meet in Montreal next month. The Guide is being revised.

10.9.2 Old Business

Everett Hager reported that the Phase Shifting Transformer Standard has been finalized and will be issued in the near future.

He also reported that the minutes from the SC will not be mailed to members, but will be posted on the Transformers Committee website. All minutes will eventually be posted in this manner.

He also requested updated rosters from each WG and TF chairperson, to be sent to him and to Joe Watson via e-mail.

The meeting adjourned at 10:20 am.

Submitted by: Joe Watson, Secretary

10.10 Underground Transformers & Network Protectors SC – C. G. Niemann, Chair

10.10.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met on Wednesday, April 17, 2002, in Salon 1 of the Westin Bayshore Hotel & Marina at 1:30 PM with eight members and six guests present.

10.10.2 Approval of Minutes

The minutes of the October 17, 2001 meeting in Orlando, Florida were approved as submitted.

10.10.3 Membership

Two guests, Paul Orehek and Mark Faulkner, attending the meeting requested membership. Membership now stands at 20 members.

10.10.4 Chairman's Remarks

10.10.4.1 Administrative Subcommittee Notes Reported to SC

- Attendance at meeting is 271 registered and 81 companions.
- There will be know joint meeting with the PES Power Group in 2004 in Denver.
- IEEE "C57 Phonebook", expect decision by end of June. Probably will be issued in CD format.
- Understanding from IEEE that removal of MOU for co-secretariat does not effect the MOU for co-copywrite. NEMA says the opposite. Will see what happens at ASC C57 Main Committee Meeting.

10.10.5 Working Group Reports

10.10.5.1 Three-Phase Underground-Type Transformers (C57.12.24) J. Sullivan – Chairman

No report, did not meet.

10.10.5.2 Liquid Filled Secondary Network Transformers (C57.12.40) B. Klaponski/L. Plaster – Co-Chairman

1. Met on Monday, April15, 2002 at 11:00 AM with 11 members and three guests present.
2. Minutes of the October 15, 2001 meeting in Orlando, Florida were approved as submitted.
3. Discussed revised pages 12 thru 16. A PAR was approved to have this standard reprinted by IEEE with editorial corrections from standard printed by NEMA. NEMA had printed this standard with dual unit system. To change this standard to entirely metric would delay reprinting. Chairman will check if IEEE will reprint with dual unit system.
4. Next revision of this standard will begin as soon as it is reprinted by IEEE with editorial corrections.
5. Meeting adjourned at 12:15 PM.

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

1. Met on Monday, April 15, 2002 at 3:15 PM with six members and two guests present.
2. Minutes of the October 15, 2001 meeting in Orlando, Florida were approved as written.
3. PAR has been approved for next revision to standard.
4. The new composite frame breaker was discussed. It was decided to call this 'Type 2' and the original/traditional breaker 'Type 1'.

5. Richards and Eaton Cutler-Hammer to review BIL test levels and report back at next meeting.
6. Distributed comments from Joe Cultera but did not have time to discuss.
7. Request two sessions for next meeting in Oklahoma City.
8. Meeting adjourned at 4:45 PM.

10.10.5.4 Ventilated Dry-Type Network Transformers (C57.12.57) A.L. Robinson – Chairman

No report, did not meet.

10.10.6 New Business

1. Discussion on removal of metric units from standards. Subcommittee is in favor of dual unit system.
2. Discussion on withdrawal of MOU for co-copywrite with NEMA. Will wait to see what comes out of ASC C57 Main Committee meeting.

The Subcommittee adjourned at 2:45 PM.

Submitted by Carl Niemann, Chair

10.11 Audible Sound and Vibration SC – Jeewan Puri, Chair (Presented by Jim Nielsen)

10.11.1 Introduction and Chairman's Remarks

The Audible Sound & Vibration S.C. met at 8:00 a.m. with 16 members and 9 guests present.

The minutes of our October meeting in Orlando, Florida were approved as submitted.

During the Chairman's remarks, Jeewan Puri reported that he had proposed extending NEMA tables TR1 & ST20 on standard sound levels on liquid filled and dry type transformer for including additional kVA ratings. There was further progress on this issue.

Jeewan will draft a formal letter to NEMA on this issue with the help of the SC and request further action.

10.11.2 Report – WG for Writing Sound Level Measurement Procedures

Jim Nielsen; the Chairman of the WG for writing "Sound Level Measurement Procedures" reported that this WG met on Tuesday at 3:15 p.m. with 13 members and 10 guests present.

The WG resolved all the technical and editorial comments on the second draft of section 13 describing the sound level measurement procedure using sound intensity and sound pressure methods.

Draft 3 of this document will now be circulated in the sub committee before it is submitted for inclusion in C57-12-90 and C57-12-91 test codes for liquid filled and dry type transformers.

10.11.3 New Business

The SC agreed to start working on the sound level measurement guide using IEC 60076-10-1 as the reference document.

The WG will also evaluate combining “Transformer Siting Guide” with “The Sound Level Measurement Guide.”

Mr. Bill Chiu of Southern California Edison proposed that using sound level measurements as a diagnostic tool should be considered. This could be an indicator of winding looseness.

Mr. Jesse Patton of Tch. Services Inc. agreed to prepare a brief tutorial on this subject for our next meeting. The effects of harmonics on sound levels will also be explored.

Jim Nielsen accepted to be the Secretary of this SC. The meeting adjourned at 9:00 a.m.

Submitted by Jeewan Puri

April 16, 2002

10.12 Bushings SC – Fred Elliott, Chair

10.12.1 Introduction and Membership

Chairman, Fred Elliott opened the meeting at 3:00 PM and welcomed the members and guests. Fourteen members and 28 guests attended the meeting. One request for membership was received.

10.12.2 Chairman’s Remarks

The chair reviewed the highlights from the Administrative Subcommittee meeting held on April 14th 2002. These highlight are as follows:

- Hotel in Oklahoma City is already accepting requests for reservation for the next meeting
- Adm. Subcommittee voted not to meet at the same time as the PES meeting as the major concern was that a combined meeting could distract from the standards making efforts
- C57 Standards may be published in a CDROM format in a few months.

Other items covered in the Administrative Subcommittee meeting will be detailed in the Transformers Committee meeting minutes.

10.12.3 Approval of Minutes of October 17th, 2001 Meeting

The minutes were approved as written.

10.12.4 Working Group / Task Force Reports

10.12.4.1 WG on General Requirements and Test Procedure For Power Apparatus Bushings (C57.19.00)

Keith Ellis reported that his WG met on April 16, 2002 at 11:00 AM with 16 members and 20 guests present. Three requests for membership were received. He reported the following:

1. Approval of Last Meeting Minutes

The minutes were approved as written.

2. Discussion on Draft 6

The final 8 items of discussions from Draft 6 were reviewed and agreement on each item was reached. With the completion of discussion on these items, the final document will be prepared and sent to the IEEE Standards Association for ballot as soon as possible. It was agreed that the WG will meet for two sessions at the next meeting in Oklahoma City to address the comments from the SA ballot.

3. New Business

No new business was discussed

4. Adjournment

The meeting was adjourned at 2:15 PM after two sessions.

10.12.4.2 Task Force on Draw-Lead Bushings

Russ Nordman reported that his Task Force did not meet this time. He indicated that much of the remaining work could be done thru Emails. He expected to complete the recommendations before the next meeting in Oklahoma City.

10.12.4.3 Report from Technical Advisor to IEC 36 A

Russ Nordman reported that SC36A bushing meeting was held in conjunction with IEC general meeting in Florence, Italy on October. 19-20, 2001. The following were discussed in this meeting.

1. Draft for the IEC 62199 Standard, Bushings for DC application, was circulated. The draft minimizes duplication of clauses with IEC 60137, which is the main standard. The proposed 1-hour power frequency test was deleted. Routine switching impulse tests to be done by agreement only. Thermal stability test was deleted.
2. Draft for the IEC 60137 Standard, Insulated Bushings for Alternating Voltages above 1000 kV, was circulated. Routine lightning impulse test for 850 BIL rating was proposed. Switching impulse type test for ratings below 300 kV was deleted. Voltage ratings for 525 kV and 765 kV were changed to 550 kV and 800 kV respectively.
3. IEC 61639 Standard, Direct connection power transformer to GIS switchgear, 72.5 kV and above, is up for review. No technical changes have been proposed. Editorial review after the revision of IEC 60157 Standard, Gas Insulated Switchgear.
4. CENELEC and TC36A are working on a new document for Capacitance Graded Outdoor Bushings. This standard will cover dimensional requirements and will require compromise between

the Utilities and the Manufacturers.

10.12.5 Old Business

10.12.5.1 Reaffirmation/Revision of C57.19.100

Fred Elliot reported that the negatives were addressed. The document is being put forward for approval and publishing.

10.12.5.2 C2 Measurement Study Group

Mark Rivers presented some data on PF variations on bushings of four different types. The C2 power factor varied from 0.1 % to 19 %. These field measurements show a very wide variation in test values, indicating the effect of different factors and types of bushings. It was recommended to take no further action on this issue as the revision of C57.19.00 is nearing completion and any changes to the C2 requirement will delay the approval process.

10.12.5.3 DC Bushing Standard

The DC bushing standard C57.19.03 is expiring at the end of this year. Because of lack of time and absence of existing DC projects, this standard may have to be reaffirmed.

10.12.6 New Business

10.12.6.1 TAG for IEC 36A Committee

John Gauthier from NEMA reported the following:

1. IEC and CENELEC ([European Committee for Electrotechnical Standardization](#)) standards can be adopted by each other
2. There is a proposal to restart the USA TAG for the IEC 36A committee. Minimum three people are required for this group. It has a membership fee of \$250 per year. The group could meet during the IEEE transformer committee meetings or some other time. He asked for volunteers. For membership, please contact John at the following:

John A. Gauthier Email: GAUTHIER@FIDNET.COM

TEL: 417 926 4603

10.12.7 Future Meeting Topics

The following were discussed:

1. Standards for “Bulk Type Bushings”

A couple of guests expressed interest for a standard on bulk bushings. In order to determine

the feasibility of forming such a TF, interested members and guests are requested to contact Bushing Subcommittee Chair, Fred Elliott.

2. Transformer/GIS Bushings

Russ Nordman agreed to present some information at the next meeting and discuss the need for such bushings.

10.12.8 Adjournment

The meeting was adjourned at 3:48 PM

Minutes Submitted By, Pritpal Singh, Secretary Bushing Subcommittee

11.0 Reports of liaison representatives

11.1 EPRI – B. Ward

Memorandum



April, 2002

TO: Mr. Donald J. Fallon
Secretary, IEEE Transformers Committee
PSE&G
80 Park Plaza - T14A,
P. O. Box 570
Newark,
NJ 07101-0570

FROM: Barry Ward, Manager, Power Transformers

SUBJECT: **EPRI LIAISON REPORT**

The following report is for inclusion in your minutes for the April 2002 meeting in Vancouver:

1. Moisture Dynamics:

EPRI has sponsored extensive research targeted at understanding the dynamic behavior and effects of moisture in transformer insulation systems. The 2001 research results are published in a report titled *Transformer Condition Assessment and Diagnostic Methods Phase 4: Green-Yellow-Red Diagnostic Method* (1001940). Highlights of the 2001 study are: An investigation into the solubility of water in different oils—new, refined and aged oils; further investigation into factors affecting moisture dynamics in transformer insulation; the development of a new classification procedure for the ranking of critical power transformers by the level of moisture for further continuous monitoring; development of a stand-alone software application “Transformer Moisture Monitor” (TMM), presently being beta tested, for moisture assessment in a paper-oil transformer insulation system, and a feasibility study to determine whether moisture has an effect on frequency response analysis (FRA) signatures. For additional information on this on-going project, the following reports are available: *Power Transformer Insulation Behavior During Overload—Phase 1: Dynamic Behavior of Moisture* (TR-113390), *Transformer Moisture-in-Paper Assessment Method—Field Trial* (TR-114075), *Green-Yellow-Red Diagnostic Method—Transformer H₂O Assessment Method* (1000724), and *Transformer Moisture Assessment Method—Phase 3: Testing of Nitrogen Blanketed Transformer Insulation and Development of Software Application*.

2. Power Transformer Loading Software PTLOAD

EPRI's Power Transformer Loading program (PTLOAD 5.1) calculates transformer oil and winding temperatures, thermal ratings, insulation loss-of-life, and the likelihood of gas bubble formation. The calculation methods, which incorporate user-specified load and air temperature, are based on the IEEE C57.91-1995, "Guide for Loading Mineral-Oil-Immersed Transformers" as well as the IEC Standard 354, "Loading Guide for Oil-Immersed Power Transformers." Version 6.0, which will include a three-winding (dual secondary) transformer model and other features, is currently in beta test.

3. Transformer On-Line Diagnostics and Loading Software

The objectives of this project are the development and installation of software to determine the real-time overload capability of a power transformer without exceeding specified temperatures or significant loss of life and to monitor the real-time thermal performance of a power transformer to verify that the cooling system is operating in accordance with specifications. The software will use actual load and temperature data from the SCADA system and use the PTLOAD calculation engine to check the thermal performance of the software in real time.

4. On-Line Transformer Condition Assessment

This project is a continuation of earlier EPRI efforts to develop an on-line low cost gas analyzer that were abandoned because of baseline drift of the sensors. A "key gas" analyzer uses metal-insulated-semiconductor (MIS) sensors to monitor individual ppm for hydrogen, acetylene, ethylene and carbon monoxide. An EPRI/Micromonitors/Sandia National Labs collaborative project was initiated 2/99 to solve technical problems that have delayed commercial production of the MIS sensors. Current work at Sandia National Labs will first concentrate on producing a complete model for a hydrogen only sensor with lab verification. The feasibility of an acetylene sensor will also be studied.

Experimental work is on going to identify the dynamic behavior of gases and other byproducts associated with loading and internal problems. Current work is focused on the development of on-line monitoring techniques to detect the insulation fault products during overload conditions. Specifically this project will demonstrate the application of fiber optic, infrared or electrochemical sensors for on-line monitoring of specific paper decomposition products.

5. On-Line Frequency Response Analysis (FRA)

Previous work in this project includes the field assessment of the in-situ, on-line impulse technique and the off-line swept frequency method to determine the feasibility of comparing signatures from one technique with signatures from the other, for the assessment of winding movement. Additional field tests were performed in August, 2001. A report titled *On-line Frequency Response Analysis System: Development of Specifications* (1001942) is now available. Results of the research asked more questions than were answered; consequently, a different direction has been taken for 2002. The current work will attempt to develop the new off-line technique, patented by NEETRAC, into an on-line system. The advantage of the new technique is that it does not require comparison with previous tests to make an analysis of the winding condition.

6. Transformer Expert System - XVisor

The objective of this project is to capture the knowledge of transformer experts and make it usable in an off-line software tool for the evaluation of transformer design questions, condition assessment, problem diagnosis, and identification of maintenance needs. XVisor Version 1.1, which includes an LTC module, is now available. A case study is currently being carried out at four utilities in which the objective is to analyze and diagnose the condition of 200 transformers. Transformers with known condition will be included. The objective of the study is to prove the validity of the diagnostic engine.

7. Guidelines for Life Extension of Substations

These guidelines, now published in Final Report TR-105070 dated April 1995, include a large section on transformer inspection, condition assessment, testing, and maintenance practices. An extensive update and extension, *Guidelines for the Life Extension of Substations (CD-ROM Version)*, EPRI 1000032 is now available. Work continues to update the guidelines as new information is gathered.

8. Low Maintenance LTC

A workshop was held November 1996 in Tampa, FL. to provide a forum for discussion of LTC problems / maintenance / and ways to improve reliability and reduce maintenance. Proceedings were published in TR-108398 dated June 1997. Two EPRI projects to improve understanding of contact coking, oil filtration effectiveness and monitoring concepts were recently completed. Further work is on going regarding coking, filtration, effect of contact material, the development of oil characteristic signatures for normal and abnormal operation, and novel methods for on-line monitoring. Two reports were published in December 2001. They are: *Transformer Load Tap Changer Management: Diagnostics, Contact Coking, and On-line Oil Filtration* (1006654) and *Development of Load Tap Changer Monitoring Technique: Mechanism of Coking* (1001946)

9. Continuous Main Tank On-Line Oil Filtration

The objective of this project is to develop or adopt technologies for a passive on-line filter for mounting on transformers to continuously remove moisture, oxygen, and oil degradation products to keep oil in pristine condition and thus retard the aging of the cellulose insulation. Laboratory experimental work has been completed. Full-scale simulation tests are in process, and a field demonstration is underway. A patent for a special purpose filter designed for the removal of moisture, oxygen, and certain other chemicals has been issued. Field trials are under way. A report was published in December, 2001 titled: *Transformer Life Extension by On-Line Continuous Oil Treatment and Monitoring: Field Test Report* (1001959)

10. Transformer End of Life Assessment

The objective of this project is to develop methods for assessing the condition of high voltage power transformers nearing end of life. The methods will be based on results obtained from testing aged transformers in-situ in the power system and will provide the basis for informed replace/continue to use decisions to power utilities. The project will identify and/or develop non-destructive techniques suitable for performing the condition assessment, in-situ, under typical field conditions. Testing will be performed on old power transformers that are being replaced. Correlations will be developed between results from on and off-line non-destructive testing (conventional and more novel tests) and destructive

assessment, including addressing issues of extrapolation of results to large power transformers. We are currently looking for transformers that are due to be retired and scrapped.

11. Detection, Location and Characterization of Gassing Sources in Power Transformers

The detection of acoustic emissions from pd events is a well-known technique and instrumentation is available. However, acoustic emissions from transformers have been detected in the absence of pd. It has been determined that these signals are produced as a result of the inception of bubbles. Analysis of these signals from a population of gassing transformers could result in a new diagnostic technique for the detection, location and characterization of the gassing sites. In this project, approximately 75 gassing and non-gassing transformers will be tested using acoustic techniques. The objective is to build a database to relate acoustic emission signal patterns to severity and type of fault and to develop software to detect fault conditions using acoustic techniques.

12. Detection, Location and Characterization of Partial Discharge in Transformers

A two year project to develop instrumentation capable of classifying pd in substations is underway. The first stage of the project involves detection and location of pd; subsequent work will be classification and characterization to identify the materials involved in the pd and, consequently, the likely development of the pd activity. Two 240 MVA transformers, soon to be removed from service due to pd activity, will be used as test beds for the pd analysis work. Both of these units will subsequently be torn down, allowing for confirmation of source and cause of pd activity. This project covers development of hardware, analysis algorithms and field-tested prototypes. These will be produced through contracts with HV monitoring equipment manufacturers, universities with experience of pd and signal analysis, and collaboration with experts in the area of application. In addition, four companies with commercially available pd test equipment will be taking part in the experiments.

13. Development of a Fiber-Optic Acoustic PD Sensor

A fiber-optic, acoustic sensor and instrumentation for in-tank detection and location of pd has been under development for approximately three years. The prototype sensor has been tested successfully in the laboratory. The next task will be to verify the system in an operating transformer. This will take place next month on one of the transformers described in the previous project. A report titled *Development of a Prototype Fiber-Optic Acoustic PD Sensor For Inside Transformer Installation* (1001943) was published in December 2001.

14. High Voltage Instrument Transformers & Bushings

A project has been completed to monitor a large number of HVCTs and bushings in laboratories and in service, including on-line tan delta, partial discharge (pd) and other available monitoring methods. Units were tested to failure to evaluate failure modes, sensitivity of monitoring and to develop "end-of-life" criteria for interpretation of field monitoring data. A Symposium: *HVCTs & Bushings – Failure Prediction & Prevention*, was held September 22-24, 1999 in Portland, Oregon. Proceedings, TR-113649, are published.

Three of the different failure detection methods were tried at three different utility sites. These are: an acoustic pd system for measurements in the field and an on-line tan delta system being evaluated under field conditions but with accelerated aging and an electrical pd method for detecting internal pd, on-line and without taking an outage has been completed.

A new project is currently being initiated to compare on and off-line bushing or HVCT power factor measurements in the field. The measurements from a low cost on-line power factor measurement system, available commercially, will be compared with traditional measurements on good and suspect bushings to determine the relative merits of both tests.

EPRI Power Transformers and HVCTS Working Group

All of the preceding projects are discussed at Working Group meetings held twice each year. The next meeting will be held immediately following the Transformers committee meeting in Oklahoma City in October.

11.2 SCC4 - P. A. Payne

April 12, 2002

Liaison Report to IEEE PES Transformers Committee

Standards Coordinating Committee on Electrical Insulation – SCC 04

1. Committee Scope:

- *To formulate guiding principles for the evaluation of insulation materials and systems for electrical and electronic applications.*
- *To formulate principles for the identification of insulation materials and systems based on functional tests and/or experience.*
- *To coordinate the preparation of standards for functional test programs and diagnostic methods for the evaluation of insulation materials and systems.*

2. Activities:

- **IEEE 1-1986 (R2000) Recommended Temperature Limits in the Rating of Electrical Equipment and for the Evaluation of Electrical Insulation:** Revision was published April 30, 2001.
- **IEEE 98-1984 (R1993) Preparation of Test Procedures for the Thermal Evaluation of Solid Electrical Insulating Materials:** The Letter Ballot closed December 14, 2001. The Draft was submitted to REVCOM February 13, 2002 for approval.

- **IEEE 99-1980 (R1992) Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment:** This standard will be reviewed to determine if IEC 62114, Electrical Insulation Systems - Thermal Evaluation (published October 2001) can be adopted, the standard will be withdrawn otherwise, IEEE 99 will be revised for consistency with IEEE 1.
- **IEEE 943-1986 (R1992) Guide for Aging Mechanisms and Diagnostic Procedures in Evaluating Electrical Insulation Systems** has been withdrawn and IEC 60610 *Principal Aspects of Functional Evaluation of Electrical Insulation Systems: Ageing Mechanisms and Diagnostic Procedures* adopted.

Respectfully submitted, Paulette A. Payne

11.3 TC 14 TAG - P. J. Hopkinson

MINUTES - TC14 Technical Advisory Group

Place of Meeting: Westin Bayshore Resort & Hotel, Vancouver, BC, Canada

Date & Time: Monday, 15 April 2002

INTRODUCTIONS

Members Present

C. Colopy	Cooper Power Systems
D. Foster	Olsun Electric Corp
J. Gauthier	Consultant
R. Girgis	ABB Power T & D
P. Hopkinson	Square D Company
C. Johnson	ABB Inc
S. Kennedy	Niagara Transformer
R. Marek	Dupont Advanced Fibers Systems
P. Payne	PEPCO
J. Puri	Consultant
H. Jin Sim	Waukesha Electric
L. Wagenaar	American Electric Power

Others Present

D. Allan	Chairman, IEC TC14
D. Brender	Copper Development Association
N. Bush	CDA
T. deCourcelle	IEEE Standards

L. Dix	Quality Switch
D. Fallon	PSE & G
J. Fyvie	VA Tech Transformers, UK
R. Girgis	ABB Power T & D
J. Kelly	S.D. Myers
A. Kline	Consultant
N. McQuin	McQuin Electrical Power Consulting
R. Nordman	Lisbon Engineering
G. Pregant	Delta Group XFD
R. Simpson, Jr	Quin-T Corp
H. Zarmandily	Schneider Electric Co

Approval of Previous Minutes - The minutes of the meeting held on 16 October 2001, were approved as submitted.

Approval of agenda - The agenda was approved as issued.

Membership - Members reviewed the TAG roster and made such corrections and changes as needed. Note was made of the need to pay dues promptly. The USNC has sent billings for this year's membership.

Old Business

The Technical Advisor reported that there were a number of TC14 document circulated to national committees for comment and/or vote in preparation for the committee's plenary meeting in September. He reported that he had reviewed a number of the status and conducted a brief document by document review:

A. Revision of IEC 60076-5 (Ability to withstand short-circuit)

It was noted that a document issued by TC14 contains an annex that requires testing and not calculations. It was noted that Jim Fyvie heads a CIGRE WG that has developed a document for consideration. The community is awaiting the issuance of that document for consideration.

Members engaged in a brief discussion on current work under development in CIGRE and experiences in assessing short-circuit failure rate of transformers.

Members engaged in an extended technical discussion on using the calculation methodology for determine the withstand short-circuit test, noting that the failure rate of devices in the field was 1 in 8000 manhours per year but under the test conditions, the failure rate was 50%.

B. Revision of IEC 60076-3 (Insulation levels and dielectric tests)

Document approved and published.

C. 14/413/FDIS 60076-4 Lightning Impulse

The US has voted favorably for this FDIS. It contains the basic elements the US feels should be included in such a standard.

This document covers both industrial and HV DC applications and appears acceptable.

D. Revision of IEC 60378-3 (Converter Transformers for HVDC)

The work on the document is complete.

E. 14/409/NP – IEC 60378-3 Guide for application

After review, the Technical Advisor proposed to vote affirmative. It was noted the document covers both industrial and HVDC applications

F. Revision of IEC 60214 (Tap Changers)

Action on this document is complete. Craig Colopy and Tom Traub have been effective in working with this WG to include US concerns and related US standard issues addressed in the document.

The TA expressed disappointment that the test for thermal stability is missing from the document. This requirement is being pursued in US documents and would likely result in the pursuit to include the requirement in a future revision of IEC document 60214.

It was noted also that 14/415/MCR had been issued for an application guide. It is expected that a CDV will be circulated by January 2003.

G. Revision of IEC 60551 (Audible Sound)

It was reported that 60551 is now IEC 60076-10. A CD document (14/400/CD), titled User guide for sound level determination (IEC 60076-10-1) has been issued. It was noted that the US expert to the TC14 WG responsible for this document has presented data to the WG on US applications, particularly those contained in NEMA TR-1, but that was not accepted. It was noted that sound level standards are needed. The Technical Advisor noted that the reference tables in the document appear acceptable.

H. IEC 60076-7 (Liquid filled Loading Guide)

It was noted that the committee has issued for national committee comment its latest draft 14/414/CD which is similar to the US document C57.91 but containing fewer references.

It was noted that the loading guide for IEEE contains tables for life loss and permissible loading. These are missing from the IEC document. It was noted that Hasse Nordman, from Finland, is the new chairman and is present at the IEEE meeting.

I. Discussion of new document 14/397A/NP (High temperature insulation for liquid filled transformers)

A new document Guide is under development. A couple of issues: the WG has 7 members, the group is seeking an expert from TC10 to obtain technical information. This document will use IEEE 1276, which was for mineral oil only. The IEC document will address additional oils.

It was noted that there is no US expert on the WG. A US expert with utility experience and technical knowledge of the subject is needed. A candidate will be sought in the IEEE Transformer Committee. Joe Kelley is a leading candidate!

The TA asked if the upper limit of the operating temperature has been defined. It has not.

It was noted that TC98 is seeking to address high temperature insulation systems for fluid filled devices and it is hoped that the information on establishing thermal values will be available. Bill Simpson indicated a willingness to serve as the liaison between TC14 and TC98. It was recommended that such an arrangement be raised at the plenary meeting of TC14 in Rome

The US TA for TC10, Joe Kelley, provided members with a brief overview of on-going activities in IEC TC10 for which they may have interest: IEC 60296, IEC 60490, IEC 60567 and IEC 60422.

J. Revision of IEC 60076-11 (Dry-type power transformers)

The slow work in the WG is the cause for the rescheduling of the plenary meeting of TC14. The document was the subject of considerable discussion at the last TC14 meeting and received considerable comment that did not sit well with the convenor.

K. Valuation of flame resistance test.

Members engaged in an extended discussion of the conduct of the test and its consequences. The underlining question, it was noted, is whether or not the test is a realistic one. It was also noted that there was no way to detect the problem externally. Two categories F1 and F2 – one requires the test and one does not require.

L. Distribution Transformer Energy Efficiency.

The leadership missed the window of opportunity to present a new work proposal to the IEC. It was noted that the European standard organization CENELEC has addressed efficiency in some manner and is expected to submit a document to the IEC for consideration. It is likely not to be accepted because it is a regional or local matter (US, Japan, etc).

M. Review activities of IEC TC106 (EMF)

The TA briefly reviewed key issues and data under review and commented on the studies that have been developed and considered to date. It was noted that the concerns were more related to economic (trade) rather than human injury.

New Business

A. Technical Advisor for TC14

Mr Hopkinson reported that his company had withdrawn from certain aspects of the transformer business and that they no longer endorsed his participation in the IEC activities. He reported that in light of the funding support he would receive from NEMA to attend the next plenary meeting of TC14, he would remain in place until early next year. Members engaged in a brief discussion on the duties and

responsibilities of the position. It was requested that interested candidates for the position should contact the TAG Administrator.

B. TC14 Meeting in Rome, Italy

The convenor noted the rapid influx of TC14 standards for national committee review and in preparation for the plenary meeting in Rome, Italy from 25 to 27 September 2002.

C. Retirement of the chairman of IEC TC14

The chairman reported the Dr Dennis Allan, the chairman for IEC TC14, has announced his retirement after the September meeting in Rome. Members engaged in a brief discussion of finding an interested and qualified US individual to pursue the position. Members were requested to send their nominations for the position to the TAG Administrator before 11 May 02.

D. Discuss and adopt USNC TAG operating procedures

It was noted that the USNC has approved a requirement that all USNC-recognized Technical Advisory Group put in place operating procedures. In doing so, the USNC provided a copy of the operating procedures to review and adoption. It was noted that this document would be circulated also to members very shortly for their approval. The technical advisor recommended that the documents be quickly reviewed and approved. The document will be sent to the membership shortly for appropriate action.

Time and Place of Next meeting - The chairman noted that the next meeting of the WG would be held in October, during the IEEE Transformer Committee meeting in Oklahoma City, OK in October.

Adjournment - There being no additional business, the meeting was adjourned at 4:35 pm.

Submitted by P. J. Hopkinson

11.4 CIGRE – Jean-Christophe Riboud

11.4.1 Cigré

Cigré is an international organisation dealing with generation, and high voltage transmission of electricity. Cigré stands for Conseil International des Grands Réseaux Électriques (International Council on Large Electric Systems).

Its main goals are:

- To facilitate and develop the exchange of engineering knowledge across all countries
- Add value to knowledge by publication of state of the art and commonly used practices.
- Exchanges with partners (IEC, IEEE, CIRED, EURELECTRIC,..)

Cigré is divided into several 15 Study Committee until August and will be 16 after Paris session.

A session with all SC is held every even year in Paris on the last week of August

11.4.2 SC 12

SC12 deals with power transformers and reactors.

The SC12 strategic issues are:

Service to customer in terms of reliability, life management, economics, and tutorials
Technology issues in terms of safety, new technologies, pre-standardisation work...

The latest activities were on:

- Instrument transformers
- Life management of transformers
- Short circuit performance of power transformers
- Guidelines for transformer design reviews
- Dielectric responses

Working group ongoing

- Economics of transformer management
- Electrical environments of transformers (related to failures due to HV breakers transformer interaction)
- Transformer life datamanagement
- New Advance in DGA interpretation
- Analysis of converter transformers performances

Starting working group

- Phase shifter
- Thermal performances

11.4.3 Paris Session program for SC12

Panel session: Transformer decision making

- Lectures on technical option, economics and risk assessment

Workshop T&D electrical environment of transformers

- Electrical stresses
- Electrical performances, technology trends

You can find more on www.cigre-sc12.org

Submitted by JC Riboud

12.0 Old Business

Secretary Don Fallon noted that, while Minutes for this Meeting will be printed and distributed by mail, in future it is the intent of the Committee that electronic posting on the Committee website will be the primary means of communication of Minutes. Subcommittee Minutes are posted as soon as they are available. Members and guests are encouraged visit the site often for the latest postings of Minutes and other Committee items of interest.

There were no other items of old business.

13.0 New Business

Prit Singh raised a question on whether there would be interest in hearing from manufacturers of insulating paper on advances in their technology. He notes that paper is an integral part of the insulation system for transformers, and a presentation or other discussion by manufacturers may be of value.

The Chair acknowledged the potential value of such discussion. Parties interested in possibly participating in a tutorial session on the subject should contact one of the Committee officers, or the Meetings Planning SC.

The Chair also reminded all members of the work in PES in the Emerging Technologies Coordinating Committee. Any ideas related to new technologies, or new applications for existing technologies, pertaining to the scope of the Transformers Committee, should be brought to the attention of the Committee officers. Appropriate communication will be made with the PES Emerging Technologies Coordinating Committee, and needs and actions within the Transformers Committee will be considered.

There were no other items of new business.

14.0 Adjournment

The meeting was adjourned at 11:40 AM.

Respectfully submitted,

Donald J. Fallon, Secretary

ATTACHMENT I STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

00-4pr-02

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PURDATE PARDATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: AUDIBLE SOUND & VIBRATION					
CHAIR: J. PURI					
PHONE: (704)282-7413					
C57.136	GUIDE FOR SOUND LEVEL ABATEMENT AND DETERMINATION IN OIL-FILLED TRANSFORMER	DARWIN, A.		9/20/00	Approved Standard 9/20/00
None					
SUBCOMMITTEE: BUSHING					
CHAIR: F. E. ELLIOTT					
PHONE: (309)418-2697					
C57.19.00	GENERAL REQUIREMENTS AND TEST PROCEDURES FOR OUTDOOR APPARATUS BUSHINGS (IEEE 21)	ELLIS, K. (615)847-2157	FSIM IA/PSE ICC	IEC SC36	7/23/91 Need revision/reaffirmation by 12/02 6/20/96 P.A.B. extends to 12/20/02 2002
C57.19.01	STANDARD PERFORMANCE CHARACTERISTICS AND DIMENSIONS FOR OUTDOOR APPARATUS BUSHINGS (IEEE 24)	SINGH PRITPAL (901)696-5228	ICC IA/PSE IEC SC36A		12/29/00 Revised Standard Approved 12/29/2000 2005
C57.19.03	STANDARD REQUIREMENTS, TERMINOLOGY AND TEST CODE FOR BUSHINGS FOR DC APPLICATIONS	HEYMAN OLOF 46-240-83152			6/20/96 Need revision/reaffirmation by Dec 2002 2001
C57.19.100	GUIDE FOR APPLICATION OF APPARATUS BUSHINGS	ELLIOTT F. E. (503)230-3900	SWGK SUB FSK		3/16/95 Balloting Reaffirmation Standard Extended until 12/20/01 2001
NEW	TASK FORCE TO STUDY APPLICATION AND PROBLEMS OF DRAW-LEADS FOR BUSHINGS	NORDMAN RUSSELL (414)547-0121			NEW TASK FORCE

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: DIELECTRIC TESTS					
CHAIR: L. B. WAGENAAR					
PHONE: (614)552-1759					
C57.113	GUIDE FOR PARTIAL DISCHARGE MEASUREMENTS IN LIQUID-FILLED POWER TRANSFORMERS AND SHUNT REACTOR	PERKINS M. [314]382-2100	FSIM IA/FSI IEC TC14 L	12/5/91 9/15/99 2000	Ready for Ballot PAR extended to 12/2002
C57.127	GUIDE FOR THE DETECTION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS	J. W. HARLEY (216)425-1838	ICC FSIM IEC TC14 L	9/20/00 2005	
C57.138	RECOMMENDED PRACTICE FOR ROUTINE IMPULSE TEST FOR DISTRIBUTION TRANSFORMERS	ROSSETTI J. (901)528-4743	T&D IA/FSI FSIM	3/19/98 9/19/96 2003	PC57.138/D7 APPROVED
C57.98	IEEE GUIDE FOR TRANSFORMER IMPULSE TEST	POULIN B. (408)957-8326	NONE	12/2/93	REAFFIRMED IN 1999
NONE				2004	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: DISTRIBUTION TRANSFORMERS					
CHAIR:	Ed SMITH				
PHONE:	(314)677-3421				
C57.12.20	OVERHEAD-TYPE DISTRIBUTION TRANSFORMERS, 500 KVA AND SMALLER: H V 34500 VOLTS AND BELOW, L V 7970/13800Y & 240Y/138T	ANDERSEN GLEN WILKS, A.		6/20/96 PAR for revision approved Feb. 2002 2/1/02 2001	
C57.12.23	UNDERGROUND-TYPE, SELF-COOLED, 1-PHASE DISTRIBUTION TR WITH SEPARABLE INSULATE HV CONNECT HV 24940Grdy. L.V.240.;167kVA.	Trait A., Lee R.	T&D IAS/PSEC IC IAS/REPC	6/1/99 Reaffirmed June 1999 3/18/99 2004 Revision being balloted	
C57.12.25	REQUIREMENTS FOR PAD-MOUNTED COMP-TYPE, SELF-COOLED, 1-PHASE DISTRIBUTION TR W/SEP INS HV CONN; HV 34500Grdy ...167kVA...	LAZAR/GHAFOURI	T&D IAS/PSEC IC IAS/REPC	5/11/90 Need PAR for next revision 12/8/98 1995	
C57.12.33	GUIDE FOR EVALUATION OF LOSSES IN DISTRIBUTION TRANSFORMERS	PEKAREK T. DUCKETT, D.	FSIM	6/1/98 Ballot closed 4/1999	Need document submittal or PAR extension by 12/02
C57.12.34	REQUIREMENTS FOR THREE PHASE PAD-MOUNTED DISTRIBUTION TRANSFORMERS	Shall, Stahara (417)625-5100	ICC	12/6/00	Revised PAR approved until Dec. 2002 Being Balloted
C57.12.35	STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)	Henry, G.		6/20/96 2001	Need to revise/reaffirm by 12/02
C57.15	REQUIREMENTS, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE REGULATORS	DIAMANTIS T. COLOPY, C.	SUBS IAS/PSE	9/16/99 12/6/00 2004	
IEEE1388	STANDARD FOR THE ELECTRONIC REPORTING OF TRANSFORMER TEST DATA	SMITH J. ROLLINS (601)892-4661		12/6/00 10/1/01 2005	Revising, will publish as c57.12.37

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: DRY-TYPE TRANSFORMERS					
CHAIR: W. PATTERSON					
PHONE: (919)848-1860					
C57.12.01	GENERAL REQUIREMENTS FOR DRY-TYPE DIST. SULLIVAN J. AND POWER TR INCL THOSE WITH SOLID CAST &/or RESIN-ENCAPSULATED WINDINGS	813 -228-4111	NEMA IA/I&CPS U.L. ANSI	9/1/98 Balloting 3/1/99 2003	
C57.12.50	REQ. FOR VENTILATED DRY-TYPE DISTRIBUTION TRANSFORMERS, 1 PHASE, AND 15-500KVA, 3-PHASE HV 601-34500VOLTS, LV 120-600V	SULLIVAN J. (813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE status 1994	
C57.12.51	REQ. FOR VENTILATED DRY-TYPE POWER TRANSFORMERS, 501KVA & LARGER, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS	SULLIVAN J. (813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE status 1994	
C57.12.52	REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 501KVA & LARGER, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS	SULLIVAN J. (813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE status 1994	
C57.12.55	CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS	SULLIVAN J. (813) 228-4111		4/7/86 Need PAR for revision to get ANSI/IEEE status 1992	
C57.12.56	TEST PROCEDURE FOR THERMAL EVALUATION OF INSULATION SYST FOR VENTILATED DRY-TYPE POWER & DISTRIBUTION TRANSFORMERS	PROVOST R. L. (302)999-2225		3/1/98 REAFFIRMED IN SEPT 1998 2003	WOULD LIKE TO COMBINE WITH C57.12.60
C57.12.58	GUIDE FOR CONDUCTING TRANSIENT VOLTAGE ANALYSIS OF A DRY-TYPE TRANSFORMER	PAYNE P. (202) 388-2138	IEC IAS	9/19/96 Being reaffirmed 6/28/78 2001	Standard life extended until Dec 2002
C57.12.59	GUIDE FOR DRY-TYPE TRANSFORMER THROUGH FAULT CURRENT DURATION	PAYNE P. (202)388-2335		12/5/01 Revision approved Dec. 2001 9/21/00 2006	
C57.12.60	TEST PROCEDURES FOR THERMAL EVALUATION OF INSULATION SYSTEMS FOR SOLID-CAST & RESIN ENCAP POWER & DIST TRANSFORMER	PROVOST R. L. (302)999-2225	IEC SCISE NEMA	3/19/98 REVISION APPROVED 3/98 6/26/97 2003	WOULD LIKE TO COMBINE WITH C57.12.56
C57.12.91	TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS	BARNARD D. (919)738-4251	SFD EM T&D	12/6/00 Approved Dec 6, 200 2005	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
C57.124 NONE	RECOMMENDED PRACTICE FOR THE DETECTION OF PD AND THE MEASUREMENT OF APPARENT CHARGE IN DRY-TYPE TRANSFORMERS	R. DUDLEY PAYNE P. (202)388-2138	NONE	6/29/91 6/27/91 2001	6/29/91 BEING REAFFIRMED
C57.134	GUIDE FOR THE DETERMINATION OF HOTTEST SPOT TEMPERATURE IN DRY TYPE TRANSFORMERS	R. DUDLEY PAYNE P. (202)388-2138	NONE	12/29/00 9/21/95 2005	Approved by standards board 12/00
C57.16 NONE	STANDARD REQUIREMENTS, TERMINOLOGY, AND TEST CODE FOR DRY-TYPE AIR-CORE SERIALIZED CONNECTED REACTORS	R. DUDLEY PAYNE P. (416)298-8108	NEMA IAS T&D	12/10/96 2006	Reaffirmed on 6/13/01
C57.94 NONE	RECOMMENDED PRACTICE FOR INSTALLATION, APPLICATION, OPERATION & MAINTENANCE OF DRY-TYPE GEN PURPOSE DIST & POWER TR	R. DUDLEY PAYNE P. (919)848-1860	NONE	12/9/87 2005	Reaffirmed 6/2000
C57.96 None	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS	PIERCE L. (706)291-3166	T&D SCC14 SCC10	6/26/99 2004	IATSE
IEEE 259 None	TEST PROCEDURE FOR EVALUATION OF SPECIALTY TRANSFORMER OF INSULATION FOR SPECIALTY TRANSFORMER	SIMPSON R. W. JR. (603)284-4362	NONE	6/26/99 3/21/96 2004	
SUBCOMMITTEE: HVDC CONVERTER TR & REACTOR					
CHAIR: R. DUDLEY					
PHONE: (416)298-8108					
C57.129 None	GENERAL REQUIREMENTS & TEST CODE FOR IMMERSED HVDC CONVERTER TRANSFORMERS AND SMOOTHING REACTORS FOR DC POWER	R. DUDLEY (317)286-9387	EM T&D FSIM	6/1/00 2005	SUB
IEEE1277	GENERAL REQUIREMENTS & TEST CODE FOR IMMERSED AND DRY-TYPE HVDC SMOOTHING REACTORS	R. DUDLEY (317)286-9387	SUB	3/29/00 2005	Upgraded to full use 3/20/02

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: INSTRUMENT TRANSFORMERS					
CHAIR: J. E. SMITH					
PHONE: (919)827-3220					
C57.13	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS	NELSON T. (301)975-2956	PSIM PSR SPD	6/7/93 6/14/94 2002	Standard Extended until 12/2002 PAR Expires 12/2002
C57.13.5	TEST REQUIREMENTS FOR INSTRUMENT TRANSFORMERS OF A NOMINAL VOLTAGE OF 115KV AND ABOVE	Ma J.	SWGR EM TC 38 US T	9/19/96	Balloting Revision par extended to 12/2002
C57.13.6	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS FOR USE WITH ELECTRONIC REVENUE METERS AND RELAYS	TEN-HAAGEN C. V (603)749-8433	PSIM PSR TD		REVISED PAR DISSAPROVED 9 /96 NO PAR EXISTS

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: INSULATING FLUIDS					
CHAIR: F. GRYSZKIEWICZ					
PHONE: (617)926-4900					
C57.104	GUIDE FOR THE DETECTION AND DETERMINATION OF GENERATED GAS IN OIL-IMMERSED TRANSFORMERS & THEIR RELATION	HEINRICH F. W. (412)941-6924	PE/IC PE/SUB PE/T&D	6/2/91 Balloting 12/10/96 PAR Extended until 12/02 2002	
C57.106	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF INSULATING OIL IN EQUIPMENT	KELLY, J. 330-630-7000	NONE	6/2/91 Being Balloted 12/9/97 PAR extended to 12/2002 2003	
C57.111	GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENANCE IN TRANSFORMERS	(617)926-4900	IAS T&D ED&PG	2/2/89 NEED Reaffirmation or Revision 12/10/87 Standard Extended until 12/02 2001	
C57.121	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF LESS FLAMMABLE HYDROCARBON FLUID IN TRANSFORMERS	MESHANE C. P. (617)926-4900	FSRC T&D IAS	9/16/98 2003	
C57.130	T-U GUIDE FOR USE OF DISS. GAS ANALYSIS DURING FACTORY THERMAL TESTS FOR THE EVALUATION OF OIL-IMMERSED TRANS. AND TRANSFORMERS	HEINRICH F. W. (412)941-6924	NONE	1/30/01 0	Need to reply to REVCOM concerns Revcom disapproved submittal on 1/30/01
C57.139	GUIDE FOR DISSOLVED GAS ANALYSIS IN TRANSFORMER LOAD TAP CHANGERS	Ladrog, R.	IEC US TA	12/9/97	PAR extended until 12/02 Need to withdraw or submit new PAR
IEEE 637	GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE	(617)926-4900		6/4/84 2001	Standard Extended until Dec. 2001 NEEDS REVISION/REAFFIRMATION
IEEE1258	TRIAL-USE GUIDE FOR INTERPRETATION OF GASES GENERATED IN SILICONE-IMMERSED TRANSFORMERS	GRYSZKIEWICZ f. (617)926-4900	T&D ICC	6/15/95 0	PAR Withdrawn

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: INSULATION LIFE					
CHAIR: D. FLATTS					
PHONE: (610)774-4686					
1538	GUIDE FOR DETERMINATION OF MAXIMUM WINDING TEMPERATURE RISE IN LIQUID FILLED TRANSFORMERS	FLATTS, D.		6/1/00	Approved as new standard
C57.100	TEST PROCEDURE FOR THERMAL EVALUATION OF OIL-IMMERSED DISTRIBUTION TRANSFORMERS	LOWDERMILK L., (704)462-3113	PE/PSR IA/PSE PE/T&D	6/26/99 12/10/96 2004	
C57.119	RECOMMENDED PRACTICE FOR PERFORMING TEMP. RISE TESTS ON OIL-IMMERSED TRANSFORMER AT LOADS BEYOND NP RATING	S. Tuli 262-547-0121	PSRC IAS EI	10/10/01 5/16/00 2006	Approved New Recommended Practice
C57.91	GUIDE FOR LOADING MINERAL OIL-IMMERSED TRANSFORMERS	PIERCE L. (706)291-3166	SUB T&D FSE	6/14/95 3/24/00 2000	6/14/95 reaffirmation and corrigenda being balloted FAR for corrigenda approved 3/2000
IEEE1276	IEEE GUIDE FOR THE APPLICATION OF HIGH TEMPERATURE INSULATION MATERIALS IN LIQUID-IMMERSED POWER TRANSFORMERS	FRANCHEK M. A. (802)748-3936	T&D	6/1/97 3/21/96 2002	Approved as full use guide

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: PERFORMANCE CHARACTERISTICS					
CHAIR: D. Fallon					
PHONE: (973)430-8191					
C57.105	GUIDE FOR APPLICATION OF TRANSFORMER CONNECTIONS IN THREE-PHASE DISTRIBUTION SYSTEMS	REITTER G. (415)591-4463		6/17/92	Reaffirmed 3/99
NONE				2004	
C57.109	GUIDE FOR THROUGH-FAULT CURRENT DURATION	PATEL B. (205)877-7740	FSR	3/18/93	Reaffirmed 6/2000
NONE				2005	
C57.110	RECOMMENDED PRACTICE FOR ESTABLISHING TRANSFORMER CAPABILITY WHEN SUPPLYING NONSINUSOIDAL LOAD CURRENTS	MAREK R. P. (804)838-8080	T&D IAFSE FSR NEMA	7/2/98	
NONE				2003	
C57.123	GUIDE FOR TRANSFORMER LOSS MEASUREMENT	GIRGIS, R. (765)286-9532		9/16/99	Ballot Closes 4/11/01
PC57.123				0	
C57.133	GUIDE FOR SHORT-CIRCUIT TESTING OF DISTRIBUTION AND POWER TRANSFORMERS	McQUIN N. (412) 829-1205	T&D, SWG FSR IECTC 14	SUBS IAS/FSE IAS/REP	9/21/95
PC57.133					Balloting complete, awaiting publishing
C57.142	A guide to describe the Occurance and Mitigation of Switching Transients Induced by Transformer/Breaker interaction	DEGENEPP, R. 518-276-6367		12/7/00	
PC57.142					
C57.18.10	REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS	KENNEDY S. P. (716)896-6500	NONE	3/1/98	STANDARD APPROVED MARCH 1998
NONE				2003	
C57.21	REQUIREMENTS, TERMINOLOGY, AND TEST COEFFICIENTS FOR SHUNT REACTORS RATED OVER 500KVA	BALMA P.	EM T&D FSR	4/2/91	Balloting Reaffirmation
NONE				2001	
IEEE 638	QUALIFICATION OF CLASS 1B TR FOR NUCLEAR POWER GENERATING STATIONS	PIERCE L. W. (706)291-3166	NPE SUB SC2	3/19/92	REAFFIRMED 1999
P638				10/29/9C	
				2004	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: Power Transformers					
CHAIR: E.G. HAGER					
PHONE:					
PC57.143	Guide for Application of Monitoring Equipment to Liquid Immersed Transformers and Components	Liqu A. Lux/D. Chu		12/5/02	
C57.116	GUIDE FOR TRANSFORMERS DIRECTLY CONNECTED TO GENERATORS	REITTER G. (415)508-2850		1/3/89	Reaffirmed 6/2000
NONE				2005	
C57.117	GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS	CASH D. (702) 227-2316		6/17/92	REAFFIRMED 1998
NONE				2003	
C57.12.10	TRANSFORMERS 230kV AND BELOW - 8333/10417kVA 1 PH. -100000 KVA 3 PH w/o LTC, 100000kVA w/ LTC - SAFETY REQUIREMENTS	Javier Aiteaga (312)394-2704		6/4/87	Need PAR
NONE				1993	Coordinate with C57.12.36
C57.120	LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS	JACOBSEN R.	SUB EM ED&PG	12/29/00	Reaffirmed 12/29/00
NONE				5/1/80	
C57.125	GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION AND ANALYSIS FOR POWER TRANSFORMERS AND SHUNT REACTORS	CASH D. (702) 227-2316	T&D ED&PG ESE	6/27/91	REAFFIRMED 1998
NONE				6/28/87	
C57.131	REQUIREMENTS FOR LOAD TAP CHANGERS	Henning, W.		3/16/95	Reaffirmation ballot underway
NONE				2001	Extended until 12/2001
C57.135	GUIDE FOR APPLICATION, TESTING, INSTALLATION AND OPERATION OF PHASE ANGLE SHIFTING TRANSFORMERS	TRUMMER /Lundqu 43-3172-606-404	FSRC EMC IAS/FSP	12/5/01	Standard approved 12/5/01
C57.140	Evaluation and Reconditioning of Liquid Immersed Power Transformers	JAMES, R. (504)576-6246		9/16/99	
PC57.141	GUIDE FOR APPLICATION OF LOAD TAP CHANGERS	HENNING, W. (414)547-0121		6/26/99	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
C57.17 ANSI	REQUIREMENTS FOR ARC FURNACE TRANSFORMERS	CORSI D.			STANDARD HAS BEEN WITHDRAWN
C57.93 NONE	GUIDE FOR INSTALLATION OF LIQUID-IMMERSED POWER TRANSFORMERS.	LAU M. (604)528-3201	NONE	12/12/95 1986	WG has been established, No PAR. submitted Need PAR Reaffirmed on 6/13/01
SUBCOMMITTEE: Standards					
CHAIR: T. A. PREVOST					
PHONE:					
PC57.144	Guide to Metric conversion of Transformer Standards	Dudley, R.		12/5/02	
C57.12.00 VARIOUS	GENERAL REQUIREMENTS FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS	TULLI S. (414)547-0121		6/21/00 6/13/01 2005	
C57.12.13 ANSI	CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS			9/2/81 1987	ASSIGN TO SUBCOMMITTEE NEMA STANDARD
C57.12.53 ANSI	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND SINGLE-PHASE WITH SEPARABLE INSULATED H. 24940 grdY/14400 V AND \leq LV 240/120 V			0	ONLY TITLE EXIST (NO PAR) IS IT REQUIRED?
C57.12.54 ANSI	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND 3 PHASE DISTRIBUTION TRANSFORMERS; 2500 kVA OR \leq HV 24940 grdY/14400 OR \leq LV 480V			0	ONLY TITLE EXISTS IS IT REQUIRED?
C57.12.70	TERMINAL MARKINGS AND CONNECTIONS FOR DIST. & POWER TRANSFORMERS	Prevost, T.A. (802)751-3458	T&D SUBS ICC	12/6/00 2005	
C57.12.80 PC57.12.80	TERMINOLOGY FOR POWER & DISTRIBUTION TRANSFORMERS	TRAUB T. P. (312)394-2704	T&D SUBS	5/1/92 6/14/95 2002	Submitted to REVCOM for approval 6/2002 PAR extended to 12/02
C57.12.90 None	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF ...	TULLI S.		6/26/99 6/15/95 2004	Apply for new PAR for further revision

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE PARDATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: UG TR & NETWORK PROTECTORS					
CHAIR: C. G. Niemann					
PHONE: (708)410-5307					
C57.12.24	UNDERGROUND-TYPE 3-PHASE DISTRIBUTION TRANSFORMERS, 2500KVA AND SMALLER; HV, 34500Grdy. & BELOW, LV, 480 V AND BELOW	SULLIVAN J. (813) 228-4111	T&D IAS/PSEC IC IEC TC 14 IAS/REPC	3/17/94	Need new PAR 1999
C57.12.40	REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMERSED)	PLASTER, R.L. (804) 275-2142	T&D IAS/PSEC ICC IEC TC14 IAS/REPC NEMA	2/1/02	PARA approved feb. 2002 1998
C57.12.44	STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS	MULKEY D. H. (415) 973-4699	T&D IAS/PSEC SWGR EEI IAS/REPC NEMA	8/1/00	Revised Standard approved 8/2000 2005
C57.12.57	REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500KVA AND BELOW, W/HV 34500V AND BELOW, LV 216V. .AN.	ROBINSON, A.	T&D EEI/T&D SCC14	3/18/92 12/5/91	Need new PAR to establish standard 2000
none					

Attachment 2 COORDINATION ACTIVITIES OF THE IEEE/PES TRANSFORMERS COMMITTEE

09-Apr-02

PROJECT DATE	TITLE	COMMITTEE	CONTACT	COORDINATOR	TR SUBCOMM	STATUS
PC 37.104 7/19/96	GUIDE FOR AUTOMATIC RECLOSEING FSRC	WILLIAM STRANG	618-288-9211	H. J. SIM	702-227-2316	PERFORMANCE CHARACTERISTICS
PC37.122 3/20/97	STANDARD FOR GAS-INSULATED SUBSTATIONS SUBS	ARUN ARORA	303-674-7973	J. E. SMITH	919-827-3220	INSTRUMENT TRANSFORMERS

NOTE: Vancouver information not factored into MAX or AVG figures. Check Committee website for future update.

GROUPS	Leon MX Nov. 98	NO I.A Apr. 99	Monterro Nov. 99	Nash TN Apr. 00	Niagara Oct 00	Amster Apr01	Orlando Oct 01	Van R C Apr02	MAX	AVG
Committee Registration Members and Guests	262	262	275	302	361	265	280	280	361	285
Sponsors	40		35	04	04	67	60	81	04	63
Luncheon	262	262	216	175	217	131	140	161	262	196
SC ADMINISTRATIVE	10	22	23	23	22	18	24	23	24	21
NEWCOMERS ORIENTATION										
SC Meeting and Planning						15	17	22	15	15
SC AUDIBLE NOISE AND VIBRATION	23	28	31	21	21	17	27	25	32	25
WG Sound measurements								23		
WG Transformer siting guide C57.136										
SC BUSHINGS	25	11	27	28	28	28	20	42	32	26
WG Revision C57.19.00	36	22	23	25	38	25	27	36	38	28
TF Draw Lead Bushings	23	20	16	24	27	18	13		27	21
WG Revision C57.19.01	38	24	22	19					38	27
SC DIELECTRIC TESTS	80	52	68	91	96	62	87	93	96	77
WG Revision to Low Frequency Tests	20		54	48		34	48	40	54	41
WG Revision of Transient Dielectric Tests	20		35	43	37			38	43	34
TF Rev. to Impulse Tests							19	41	19	19
TF L.F. Transformers Dielectric Test Table		28	37		46	60	45	46	46	43
WG Partial Discharge Tests	58	41	66	47	66	65	44	41	66	55
SC DISTRIBUTION TRANSFORMERS	20	36	34	53	41		50	45	53	42
WG Dist. Substation Transformers C57.12.36	16	22		40	37		32	22	40	29
WG Overhead Type Distr. Transfs. C57.12.20	19	35	28	49	39		40	36	49	36
WG Single-Phase Submersible C57.12.23		16	10	20	18				41	21
WG Single-Phase Deadfront Padmount C57.12.25		30		47			33	35	47	38
WG Bar Coding									40	40
WG Loss Evaluation C57.12.33				45			49	41	49	47
WG Electronic Data Transmittal	12			22			17	16	22	17
WG Three-Phase Padmount C57.12.34		23		42			33	40	42	33
WG Step-Voltage and Induction Regs C57.15	16	9					26	26	26	17
SC DRV-TYPE TRANSFORMERS	26	27	25	25	31	20	20	21	33	25
WG Test Code C57.91	20	22	18	11	24	12	10	13	23	18
WG Drv-Type Reactors	6	13	9	10	11	13	7	10	13	10
WG Drv-Type Thermal Eval. And Flammability										
WG Drv-Type General Requirements C57.12.01	24	18	26	23	23	14	25	20	28	23
WG Drv-Type Thru Fault Current C57.12.59				15	16				16	16

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GROUPS	Leon MX Nov. 98	NO I A Apr. 99	Monterra Nov. 99	Nash TN Apr. 00	Niagara Oct. 01	Amster Apr01	Orlando Oct. 01	Van R C Apr02	MAX	AVG
SC HVDC CONVERTER TRANS & REACTORS	7	8	13	7	10	15	7	13	10	10
IEC TC 14 TAG					37	30	14	27	37	27
SC INSTRUMENT TRANSFORMERS	7	11	10	10	17			15	13	11
WG C57.13.5 Test Req Instr Transf >115 kVA	13	12	13	10	13	13	16	12	20	14
WG C57.13.6 Instr Transf for Electronic Meters & Relays	9		20	11				11	20	16
WG Revision of C57.13	8	12			10	10		9	17	11
SC INSULATING FLUIDS	71	56	68	75	66		70	33	84	70
SC INSULATION LIFE	58	65	56	51	66	30	100	90	100	64
WG Loading Lia. Transformer			108		58		76	86	108	81
WG Revision of Temperature Test Code	24	24	29						29	26
WG Thermal Duplicate	24	34	40	27		30	26		40	31
TF Winding Temperature Indicators	22	16	25	27	28		23	22	32	25
TF On Temperature Rise Clause 5, C57.12.00							27	34	27	27
SC PERFORMANCE CHARACTERISTICS	52	45	58	69	82	81	102	110	102	71
WG Loss Tolerance and Measurement	25	26	29	33	37	29	31	29	37	30
WG PCS Rev. C57.12.00	32	75	65	49	70	37	63	51	75	57
WG PCS Rev. C57.12.90	43	28		42	65	34	44	76	65	41
TF Joint/PSIM low pf measurement								22		
WG Switching Transients	33	40	0	52	49	39	50	45	52	42
WG DETC specifications and tests			50	49	40		3	62	50	43
SC POWER TRANSFORMERS	25	42	59	66	109	80	116	112	116	65
WG LTC Performance	29	25	30	24	21	29	24	40	31	27
WG C57.140 Transformer Life Extension		31	46	62	48	35	66	66	66	48
WG Monitoring of Liquid Immersed Transformers	42	20	54		55	70			70	54
TF Control Cabinet Guidelines							49	29	49	49
WG Revision of C57.12.10				37	30	27	34	28	37	32
WG West Coast								20	13	13
WG Installation of Liquid Filled Transformers, C57.93						39		57	39	39
WG Phase Shifting Transformers C57.137	30	31	34	26	45	25			45	33
SC STANDARDS	4	5	23	38		32	47	30	47	23
Standards Development Paractice Review										8
SC UNDERGRND TRANS & NETWK PROTCS	14	18	21	26	18	3	13	14	26	16
WG Three-Phase Underground Transfs. C57.12.24	16	10	14	27	15	4	9		27	14
WG Liquid-Filled Sec. Network Transfs. C57.12.40	16	17	15	16	15		14	14	17	16
WG Secondary Network Protectors C57.12.44	9		12	10	14		10	8	14	11
WG Dry-Type Network Transfs. C57.12.57	7	5	10	10	15		9		15	9

Note: Data maintained for four years only