

IEEE/PES
Transformers
Committee

Meeting Minutes
March 20, 2003

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

March 20, 2003

Raleigh, North Carolina, USA

IEEE/PES TRANSFORMERS COMMITTEE MEETING

Raleigh, North Carolina, USA

March 16-20, 2003

ATTENDANCE SUMMARY

MEMBERS ATTENDING, AND PRESENT FOR MAIN MEETING (3/20)

Andersen, Glenn	Haas, Michael	McTaggart, Ross	Sharma, Devki
Anderson, Greg	Haggerty, N. Kent	Miller, Kent	Shull, Stephen
Arnold, Jr., Jim	Hanique, Ernst	Mitelman, Mike	Sim, Jin
Balma, Peter	Hansen, Wayne	Molden, Arthur	Singh, Prit
Bartley, Bill	Hartgrove, Bob	Morehart, Gene	Smith, Jim
Binder, Jr., Wally	Hayes, Roger	Mulkey, Daniel	Snyder, Steven
Blackburn III, Gene	Henning, Bill	Nicholas, Ray	Stahara, Ron
Boettger, Bill	Hopkinson, Phil	Niemann, Carl	Stensland, Len
Borst, John	Iman, Mike	Orehek, Paul	Stiegemeier, Craig
Cash, Don	James, Rowland	Patel, Bipin	Sullivan, John
Chu, Don	Johnson, David	Patton, Jesse	Thompson, Robert
Cooper, Tommy	Jonnatti, Tony	Payne, Paulette	Tuli, Subhash
Darwin, Alan	Kennedy, Sheldon	Platts, Don	Veitch, Bob
Daubert, Ron	Khalin, Vladimir	Poulin, Bertrand	Wagenaar, Loren
Duckett, Don	Kim, Dong	Preininger, Gustav	Watson, Joe
Dudley, Richard	Lau, Mike	Prevost, Tom	Weffer, Felipe
Ellis, Keith	Lowe, Don	Progar, John	Wilks, Alan
Fallon, Don	Marek, Rick	Puri, Jeewan	Wimmer, Bill
Fyvie, Jim	Marlow, Dennis	Purohit, Dilip	Woodcock, David
Gardner, James	Matthews, John	Riffon, Pierre	Ziomek, Waldemar
Girgis, Ramsis	McClure, Phil	Rossetti, John	
Graham, Richard	McNelly, Susan	Schweiger, Ewald	

MEMBERS ATTENDING, BUT NOT PRESENT FOR MAIN MEETING (3/20)

Aho, David	Dohnal, Dieter	Jhonsa, VJ	Perkins, Mark
Antosz, Stephen	Foldi, Joe	Kline, Don	Plaster, Leon
Barnard, Dave	Ghafourian, Ali	Ladroga, Rick	Reitter, George
Colopy, Craig	Griesacker, Bill	Lundquist, Tom	Robbins, Chris
Corkran, Jerry	Gryszkiewicz, Frank	McShane, Patrick	Romano, Ken
Crouse, John	Hager, Jr., Red	Millward, Paul	Thompson, James
Degeneff, Bob	Harley, Jack	Moore, Harold	Ward, Barry
Dix, Larry	Harlow, Jim	Patterson, Jr., Wes	Whearty, Bob

MEMBERS ABSENT

Allan, Dennis	Bancroft, Roy	Carter, Bill	Elliott, Fred
Allustiarti, Raymond	Barker, Ron	Chiu, Bill	Feghali, Pierre
Altman, Mike	Barnes, Mike	Clark, Tom	Fleeman, Jeff
Arteaga, Javier	Bertolini, Edward	Compton, Olin	Foster, Sam
Atout, Khaled	Bonucchi, Joe	Dahinden, Vincenz	Franchek, Mike
Aubin, Jacques	Brown, Charles	Diamantis, Tom	Frank, P.E., Jerry
Ayers, Don	Cambre, Jr., Max	Ebert, John	Galloway, Dudley

Gaytan, Carlos	Lackey, John	Mutschler, Jr., Bill	Shertukde, Hemchandra
Gillies, Jim	Lazar, John	Norton, Ed	Shteyh, Ibrahim
Grubb, Bob	Lewis, Frank	Paiva, Gerry	Smith, Ed
Grunert, Bob	Lewis, Tim	Papp, Klaus	Smith, Jerry
Hall, Geoff	Light, Hal	Pearce, Henry	Smith, Ray
Hanus, Ken	Lindgren, Stan	Pekarek, Tom	Stein, Werner
Heinrichs, Frank	Long, Leonard	Perco, Dan	Stewart, Peter
Highton, Keith R.	Lowdermilk, Larry	Pierce, Lin	Stoner, Ron
Hoefler, Pete	Lowe, Richard	Raymond, Charlie	Templeton, Jim
Huddleston III, Jim	Ma, Joe	Risse, Peter	Thomas, Ray
Johnson, Jr., Chuck	MacMillan, Donald	Robinson, Butch	Traub, Tom
Juhlin, Lars-Erik	Maguire, William	Ruevekamp, Henk	Trummer, Edgar
Kallaur, Gene	Massouda, Tito	Sampat, Mahesh	Vaillancourt, Georges
Kappeler, Cal	McGill, Jack	Sankar, V.S.N.	Zhao, Peter
Kelly, Joe	McQuin, Nigel	Savio, Leo	
Kennedy, Bill	Mehta, Sam	Scheu, Bob	
Koenig, E.	Musil, R.J.	Shenoy, Vic	

GUESTS ATTENDING, AND PRESENT FOR MAIN MEETING (3/20)

Ahmad, Naem	Colquitt, Jr., Roy	Kulkarni, S.V.	Rensi, Randy
Ahuja, Rajendra	Davis, Eric	Lee, Dennis	Rezai, Hossain
Amos, Richard	Drexler, Charles	Lee, Min-Jea	Roussell, Marnie
Antweiler, Jim	Eckholz, Klaus	Leuenberger, Boyd	Sato, Mototaka
Ares, Ignacio	Forrest, George	Martinez, Al	Shertukde, Rekha
Arpino, Carlo	Forsyth, Bruce	Matthews, Lee	Shim, Hong
Ashley, Joe	Fortin, Marcel	Mitchell, Michael	Smith, Henry
Barrientos, Israel	Foster, Derek	Nelson, Tom	Sundkvist, Kjell
Basel, Dana	Garcia, Eduardo	Ngnegueu, Triumphant	Swinderman, Craig
Bassett, Tom	Garnitschnig, Andreas	Nicholas, Ron	Taylor, Robyn
Beckman, Stephen	Garza, Joseph	Nims, Joe	Teetsel, Mark
Bello, Oscar	Guardado, Jeremy	Nols, Ernest	Vogel, Herman
Bodie, Wayne	Hammers, Jack	Olen, Robert	Von Gemmingen, Rich
Boman, Paul	Heinzig, Peter	Olson, Tim	Wallach, David
Bourgault, Andre	Hochanh, Thang	Oommen, T.V.	Walls, Albert
Bush, Carl	Holland, John	Paik, Henry	Washington, Anthony
Callsen, Thomas	Irwin, Terry	Patel, Sanjay	Wicks, Roger
Cancino, Alvaro	Kennedy, Gael	Patella, Tad	Zarmandily, Hassan
Castellanos, Juan	Khaled, Samer	Peterson, Alan	
Cheatham, Mark	Kircher, Christophe	Pillitteri, Paul	
Christini, Mark	Klaponski, Brian	Raymond, Tim	

GUESTS ATTENDING, BUT NOT PRESENT FOR MAIN MEETING (3/20)

Arent, William	Berler, Zalya	Busse, Frank	Comely, Tracy
Aromin, Venzon	Betancourt, Enrique	Cargol, Tim	Corsi, Dom
Ballard, Don	Bittner, Carlos	Cavaroc, John	Costa, Florian
Baranowski, Derek	Blake, Dennis	Chen, Yunxiang	Craig, Douglas
Bartek, Al	Braun, Jean-Marie	Cherry, Donald	Culhane, Michael
Beaster, Barry	Britton, Jeffrey	Choinski, Scott	D'Amico, Frank
Beghini, Paulo Cesar	Brush, Edwin	Claiborne, Clair	Davis, Larry
Benach, Jeffrey	Buchanan, Paul	Clarke, Peter	Digby, Scott

Dooley, Patrick	Jones, Anthony	Mucha, Richard	Seay, Don
Dunn, James	Jostrand, Patrick	Nguyen, Vuong	Sinha, Ram
Edwards, Barker	Keithly, Dave	Nordman, Russ	Slovik, Thomas
El Markabi, Ismail	Kendrick, David	Nunez, Arturo	Smith, Charlie
Estey, John	King, Gary	Nunn, Tommy	So, Eddy
Fredericks, Tom	Kirker, Ron	Olsen, T. W	Speegle, Andy
Fridman, Harry	Knoll, Ernst	Oriti, Samuel	Subramanian, Raman
Ganser, Robert	Kopp, Alvin	Panian, Judith	Sweetser, Charles
Gomez Ibarra, Rolando	Kostyal, Stanley	Patel, Jashu	Swider, Joe
Goodwin, Dave	Kurth, Bernhard	Payerle, George	Swift, Glenn
Haas, Mark	Lux, Andre	Pink, Tony	Ten Haagen, Chris
Hanson, Dave	Magee, Tommy	Psyck, Rip	TeNyenhuis, Ed
Harbaugh, Tom	Mahonen, Pentti	Rahangdale, Ravi	Termine, Giuseppe
Havener, Michael	Mamtora, Jitendra	Reed, Scott	Tobin, Thomas
Hayman, Brent	Mani, Kumar	Riner, John	Tuohy, John
Henry, Dale	Marlow, Johnny	Rivers, Mark	Vinson, David
Herron, John	Marlowe, Dan	Rost, Pamela	Von Holle, Anthony
Holifield, Thomas	Martin, William	Russwurm, Dirk	Von Miller, Waldemar
Hollingsworth, Rich	Martin, Mike	Sanders, Glen	Walters, Shelby
Horning, Mike	McBride, James	Sandhu, Surinder	Wiefling, Ronald
Huff, Tim	McGrail, Anthony	Sarkar, Subhas	Wiegand, David
Jakob, Fredi	McIver, Jim	Satpathi, Debashis	Williams, Randy
Jaroszewski, Marion	Miller, Eduardo	Schappell, Steven	
Jauch, Tom	Monoski, Chris	Schroeder, Stephen	

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IEEE PES TRANSFORMERS COMMITTEE MEETING

Thursday, March 20, 2003

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. Agenda changes were noted moving item 4 (Editor's Report) and item 8 (Meetings Planning SC) to now follow the Technical Subcommittee reports. The Chair reminded all Members that a request had been made at Oklahoma City for input on enhancing the value of the Thursday Main Committee Meeting. As minimal input was received, the request was repeated. Input should be provided to any of the Committee officers for review prior to the next meeting.

Attendance Rosters were distributed, with indication that Membership status had been added to the Rosters. All Meeting participants are encouraged to work towards full membership in the Main Committee. Application forms and membership requirements can be found in the Committee Operations & Procedures (O&P) Manual, accessible on the Committee website (<http://www.transformerscommittee.org/>). Applications can be forwarded to the Secretary at any time, for action at the next Administrative SC Meeting.

An announcement was made that George Henry, of Central Moloney, had passed away just over a week before the start of the Raleigh Meeting. George had recently become a Committee Member. His colleague Ron Stahara spoke briefly of George's contributions to the work of our industry, and to the work of the Committee, and of his dedication to his family. George will be remembered for his work, and will also be remembered as a friend by many of our attendees.

Mr. Sim opened the meeting by covering a few announcements, including several items covered in more detail in the Administrative SC Minutes in Section 3. Items reviewed include:

- Review of status of the termination of the IEEE/NEMA Memorandum of Understanding (MOU) on the Accredited Standards Committee (ASC) process for approval of C37, C57, and C62 Standards as ANSI documents. While there will be a meeting of ASC C57 following the Main Committee Meeting, this issue appears to be resolved, in our case with the concerns for appropriate input addressed through the IEEE open ballot process. It is likely that ASC C57 will not meet at future Committee meetings.
- Review of status of the termination of the IEEE/NEMA MOU for joint copyright of several standards documents maintained by our Committee. This issue has been completely resolved, in our case with the transfer of the copyrights for all C57 documents formerly held by NEMA to IEEE.
- The impact of the IEEE drive for full metrification on several of our product standards continues to be an issue of concern to the Committee. Our position continues to promote the use of dual

units when we judge that exclusive use of metric units could have an unintended negative impact on safety. This item will be discussed further during the Standards Report.

- Four new Committee Members approved at the Administrative SC Meeting on 3/16/03 were announced to the group and welcomed to full Membership:
 - Tommy Cooper, Public Works Commission – Fayetteville
 - Alan Darwin, Alstom T&D Transformers
 - George Reitter, formerly Delta Star, presently Consultant
 - Waldemar Ziomek, Pauwels Canada, Inc.

- Members John Easley and Chuck Murray forwarded resignations from the Committee, with thanks for the years of association with the Committee and best wishes for all of us as we continue their work. The Chair returns their best wishes, with thanks for their years of service.

- The Administrative SC also voted on 3/16 to elevate Linden Pierce's status to Emeritus Membership, in recognition of his contributions to the industry.

The full content of Jin Sim's Chair's Report follows:

1.1 Report on the Technical Council Meeting

The new PES meeting structure eliminated the Winter and Summer Meetings and replaced them with a General Meeting in the early summer and an exhibition meeting (T&D Conference - odd year - and Power Systems Conference - even year) in the fall. We did not have a Technical Council meeting since last Summer Meeting which I already reported in Oklahoma City meeting.

1.1.1 Chair's Report

The following is an update of the report I gave in Oklahoma City:

Future PES Meetings

Toronto, General Meeting 03 July 13 – 18, 2003

Denver, General Meeting 04 June 6 – 12, 2004

Future PES "Even Year" Meetings

A meeting was held on July 22, 2002 and Power Systems Conference & Exposition was agreed as the working title for the event. Members of the PES Power Systems Committees, PES Officers and the PICA committee attended the meeting. A steering committee was formed under the Chairmanship of John Paserba.

Power & Energy Magazine

Mel Olken, who will be the editor, introduced the new magazine with a presentation, which gave a history of the PES magazines and the concepts for the format of the new publication. Based on several comments I received, the first issue of this new publication was very well received.

1.2 IEEE/NEMA MOU issue

During the Oklahoma City meeting, we formed a task force to work with IEEE staff and develop a process to address any issues resulting from the IEEE/NEMA action on the MOU. The objective of the task force was to maximize the utilization of available volunteer resources of our industry to develop and maintain our standards. As of January 21, 2003, IEEE and NEMA with the final "Assignment of Interest in Copyright" finalize all the issues associated with C57 documents. NEMA has transferred all C57 documents previously sponsored and owned to IEEE-SA so that we can revise and maintain them under the IEEE-SA process.

Attached is a copy of the final document. (Document :NEMA_IEEE Transfer.pdf' follows)

We have been working on some of these documents following the IEEE procedures as if they were IEEE documents. Any project we are working on should be covered with a PAR.

Respectively submitted,

H. Jin Sim, Chair

Chrt03s.doc

(Document :NEMA_IEEE Transfer.pdf', with attachments, follows on the next six pages)



FRANK K. KITZANTIDES
Vice President, Engineering

December 20, 2002

Ms. Judith Gorman
Managing Director,
IEEE Standards Association
The Institute of Electrical and Electronic Engineers, Inc.
445 Hoes Lane
P.O. Box 1331
Piscataway, NJ 08855-1331

Dear Judy:

As part of the realignment process associated with the termination of the Memorandum of Understanding (MOU) between NEMA and IEEE regarding the ASC C37, C57 and C62 Committees, attached are letters of transfer signed by NEMA's President, Malcolm O'Hagan, for certain standards which had been previously sponsored by NEMA under the former MOU arrangement. The standards listed in the attached Appendix A ("Works") are C37 and C57 standards being transferred from NEMA sponsorship to IEEE-SA sponsorship. All C62 standards are already under IEEE sponsorship. NEMA will retain sponsorship of the majority of the conformance assessment-related C37 standards. Those conformance assessment standards that NEMA will retain include: C37.50, C37.51, C37.52, C37.54, C37.55, C37.57, C37.58, and C37.85.

Please sign a copy of the Assignment of Interest in Copyright and return it to me for our files.

If you should have any questions regarding this transfer of standards rights and responsibilities, please call me at (703) 841-3258.

Sincerely,

Attachments

Cc: Malcolm O'Hagan, President, NEMA
Clark Silcox, NEMA
Al Scolnik, NEMA, Vice President
Industry Operations
Ted Olsen, Chair, ASC C37
Sheldon Kennedy, 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 Committee
Karen Rupp, IEEE
Jerry Walker, IEEE
Terry deCourcelle, IEEE
Claudio Stanzola, IEEE
Sue Vogel, IEEE
Bob Dwyer, IEEE Legal Counsel
Amy Marasco, ANSI Legal Counsel
Anne Caldas, ANSI
Jay Moskowitz, ANSI
James Thompson, ANSI
Wing Luk, ANSI

National Electrical
Manufacturers Association
1300 North 17th Street, Suite 1847
Rosslyn, Virginia 22209
(703) 841-3258
FAX (703) 841-3358
fra_kitzantides@nema.org

JAN 17 2003

ASSIGNMENT OF INTEREST IN COPYRIGHT

WHEREAS, the National Electrical Manufacturers Association ("Assignor"), with offices at 1300 North 17th Street, Suite 1847, Rosslyn, VA 22209, has certain rights in specified standards publications developed under the auspices of the ANSI C37[®] Accredited Standards Committee, as set forth in Appendix A (the "Works");

WHEREAS, the Institute of Electrical and Electronic Engineers, Inc. ("Assignee"), with offices at Three Park Avenue, 17th Floor, New York, New York 10016 desires to obtain from Assignor its entire interest in the copyrights to the Works; and

WHEREAS the Assignee intends to sponsor the standards development process related to the Works and the Assignor will no longer sponsor the standards development process related to the Works;

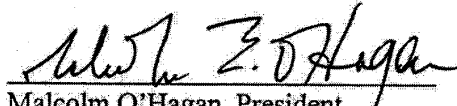
NOW, THEREFORE, in consideration of the premises and for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged:

1. Assignor hereby assigns, sells, and transfers to Assignee all right title and interest to the Works, registrations which may be secured thereon, and renewal rights therefore, as it may own.
2. This assignment by Assignor or all right, title and interest in the Works to Assignee is a transfer of full ownership in and to the work, including all rights of reproduction, distribution, performance, display and the right to create derivative works.
3. Assignor warrants that he is the sole owner of all such rights in and to the Works; that the Work is original with the Assignor and not in the public

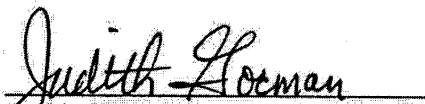
domain; that the Work does not violate or infringe any existing copyright; and that Assignor has full power to enter into this Assignment.

4. In the event that Assignee should fail to maintain any of the Works assigned hereunder as an American National Standards, Assignor shall have the immediate and unconditional right to repurchase from Assignee all of its right, title and interest in copyright to the Work not maintained as an American National Standard for the price of \$10.00 (US).

Dated: 1/15/03, ~~2002~~ ²⁰⁰³


Malcolm O'Hagan, President
National Electrical Manufacturers
Association ("Assignor")

Dated: 21 January, ~~2002~~ ²⁰⁰³


Judith Gorman,
Institute for Electrical and Electronic
Engineers, Inc. ("Assignee")

APPENDIX A ("Works")

Doc No.	Approval Date	Title
C37.06-2000	05/2000	Schedules of Preferred Ratings and Related Required Capabilities for AC High Voltage Circuit Breakers Rated on A Symmetrical Current Basis
C37.06.1-2000	03/2000	Guide for High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis Designated "Definite Purpose for Fast Transient Recovery Voltage Rise Times"
C37.16-2000	05-2000	Preferred Ratings, Related Requirements and Application Recommendations for Low Voltage Power Circuit Breakers and Power Circuit Protectors
C37.17-1997	1997	Trip Devices for AC and General Purpose DC Low Voltage Power Circuit Breakers
C37.22-1997*	1997	Preferred Ratings and Related Required Capabilities for Indoor AC Medium-Voltage Switches Used in Metal-Enclosed Switchgear
C37.32-2002	05/2002	Schedules of Preferred Ratings, Manufacturing Specifications and Application Guide for High Voltage Air Switches, Bus Supports and Switch Accessories
C37.42-1996	01/1997	Specification for Distribution Cutouts and Fuse Links
C37.43-1996	01/1997	Specifications for High-Voltage Distribution and Power Class Expulsion, Current Limiting and Combination Types of External Capacitor Fuses for Shunt Capacitors
C37.45-1981	12/1992	Specifications for Distribution Enclosed Single-Pole Air Switches
C37.46-2001	12/2001	Specifications for Power Fuse and Fuse Disconnecting Switches
C37.47-2001	12/2001	Specifications for Distribution Fuses, Disconnecting Switches, Fuse Supports and Current Limiting Fuses
C37.53.1-1989	03/1996	Conformance Test Procedures for High Voltage Current Limiting and Motor Starter Fuses
C37.121-1989	03/2000	Unit Substations

APPENDIX B ("Works")

Doc No.	Title
C57.12.10	Transformers 230 kV and Below; 833/958 through 8333/10417 kVA Single Phase, and 750/862 through 60000/80000/100000 kVA, Three Phase without Load Tap Changing; and 3750 / 4687 through 60 000 / 80 000 / 100 000 kVA with Load Tap Changing - Safety Requirements
C57.12.20	Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller; High Voltage, 34500 Volts and Below; Low Voltage, 7970/13800Y Volts and Below
C57.12.21	Requirements for Pad-Mounted Compartmental-Type Self Cooled Single-Phase Distribution Transformers with High Voltage Bushings
C57.12.22	Pad Mounted, Compartmental-Type, Self-Cooled Three-Phase Distribution Transformers with High-Voltage Bushings, 2500 KVA and Smaller; High Voltage, 34500 Grd Y/19 920 V and Below; Low Voltage, 480 V and Below
C57.12.24	Transformers Underground-Type Three-Phase Distribution Transformers, 2500 kVA and Smaller; High Voltage, 34 500 GrdY/19 920 Volts and Below; Low Voltage, 480 Volts and Below - Requirements
C57.12.25	Requirements for Pad-Mounted, Compartmental Type, Self-Cooled, Single Phase Distribution Transformers with Separable Insulated High Voltage Connectors, High Voltage, 34500 Grd Y/19920 Volts and Below; Low Voltage, 240/120; 167 kVA and Smaller
C57.12.26	Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers for use with Separable Insulated, H-V Connectors; H-V, 34 500 Grd Y/19 920 V and Below; 2500 kVA and Smaller
C57.12.28	Pad-Mounted Equipment—Enclosure Integrity
C57.12.29	Pad-Mounted Equipment—Enclosure Integrity for Coastal Environments
C57.12.31	Pole-Mounted Equipment—Enclosure Integrity
C57.12.32	Submersible Equipment—Enclosure Integrity

C57.12.40	Secondary Network Transformers Subway and Vault Type (Liquid Immersed) - Requirements
C57.12.50	Distribution Transformers 1 to 500 kVA, Single Phase; and 15 to 500 kVA, Three-Phase with High Voltage 601 24500 Volts, Low Voltage 120 600 Volt, Ventilated Dry Type
C57.12.51	Requirements for Sealed Dry Type Power Transformers 501 kVA and Larger, Three Phase with High Voltage 601 to 34500 Volts, Low Voltage 208Y/120 to 4160 Volts
C57.12.52	Requirements for Sealed Dry Type Power Transformers 501 kVA and Larger, Three Phase with High Voltage 601 to 34500 Volts, Low Voltage 208Y/120 to 4160 Volts
C57.12.55	Dry Type Transformers in Unit Installations, Including Unit Substations
C57.12.57	Ventilated Dry-Type Network Transformers 2500 kVA and Below, Three-Phase, with High Voltage 34 500 Volts and Below, Low-Voltage 216Y/125 and 480Y/277 Volts- Requirements

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2.0 Approval of Minutes of October 24, 2002 – H. Jin Sim

The Chair asked for comment/changes to the Minutes recently distributed for the October 24, 2002, Meeting in Oklahoma City. No changes were suggested, and a motion was made, seconded, and carried to approve the Minutes as written. The Secretary noted that addresses some attendees use for meeting registration do not match the addresses on record with the Committee. Contact should be made with the Secretary to confirm address of record if attendees and Members do not receive a printed copy of the Raleigh Minutes prior to the Pittsburgh Meeting.

3.0 Administrative Subcommittee – Jin Sim

Chairman Jin Sim covered the key points of the Administrative Subcommittee Meeting held on March 16, 2003. Full details of the Minutes of the Administrative Subcommittee Meeting Minutes follow.

3.1 Introduction of members and guests

Chairman Sim called the meeting to order at 2:05 p.m., Sunday, March 16, 2003, in the Hannover III Meeting Room of the Sheraton Capital Center Hotel in Raleigh, North Carolina, USA. The meeting started with introductions of members and guests.

The following members of the Subcommittee were present:

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

The following guests were present:

Naeem Ahmad (part time)	Peter Balma
Stephen Shull	

3.2 Approval of the Oklahoma City AdCom meeting minutes

The minutes of the previous Administrative Subcommittee meeting in Oklahoma City were approved as written. Greg Anderson provided comment on changes needed in Oklahoma City attendance figures as part of the Main Committee Meeting Minutes, and appropriate updates will be made.

3.3 Additions to and/or approval of the agenda

Peter Balma forwarded a request to the Chair to address the Administrative Subcommittee on the subject of recognition and awards. His discussion was added to the New Business section of the Agenda. With this addition, the previously communicated Agenda was generally followed.

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

The Meetings Planning SC report is included in the Committee meeting minutes. Items discussed during the Admin. SC Meeting include:

- Financial – Committee budget, prior to the Raleigh Meeting, was approximately \$13,787, essentially the same as at the start of the previous meeting in Oklahoma City, where it was \$13,940. The budget is at a reasonable level to provide for appropriate financing of meeting preparations.
- Raleigh Registration status – Ray Nicholas of ABB Electric provided an update on the status of meeting plans and registration totals. At the start of the Meeting, there were 308 registered

attendees and 40 registered companions. Full attendance details are included in the Meetings Planning SC Minutes. Raleigh will be one of the highest attended meetings to date.

- Meeting planning modifications include:
 - moving the Newcomers Orientation to a 7:00a.m. timeslot Monday morning. Tables will be set up so attendees can bring their continental breakfast.
 - Moving the Standards Development Process informational meeting to a Monday luncheon session, with a box lunch at cost for those registered for this session.
- Future Meetings (full details in the Meetings Planning SC Minutes):
 - October 5-9, 2003 – Pittsburgh, PA; hosted by Dennis Blake for Pennsylvania Transformer Technologies, to be held at the Sheraton Station Square Hotel.
 - March 7-11, 2004 – San Diego, CA; hosted by Ron Kirker for San Diego Gas & Electric, to be held at the Catamaran Resort Hotel on Mission Bay in San Diego.
 - Fall'04 – Edinburgh, Scotland; tentative dates October 17-21, 2004; hosted by Jim Fyvie for VATECH Peebles Transformers. Hotel arrangements have not been made yet. (See the Meetings Planning SC Report for update; September may be more likely meeting time.)
- Break Sponsorship – Greg Anderson outlined the status of the program for break sponsorships at this meeting. The program is intended to help contain costs for attendees. Present schedule includes 13 breaks, and even with limited refreshments budget for these breaks is almost \$12,000. Dry-Keep, Siemens, and SMIT are participating by each sponsoring a break during this meeting. Sponsorship costs run roughly \$750 for a beverage/snack break. The Committee recognizes and appreciates the support provided by these sponsors. If you wish to investigate future sponsorship opportunities, please contact Joe Watson (joe_watson@fpl.com). Joe is coordinating this activity.

3.5 ASC C57 ISSUES – H. J. Sim

Chairman Sim was pleased to report that the IEEE NEMA MOU (Memorandum of Understanding) issue has finally been resolved. NEMA has provided an appropriately signed letter transferring to IEEE the sponsorship of certain documents that had been sponsored by NEMA under the MOU. In our case, this includes all C57 transformer documents that had been under the sponsorship of NEMA. These documents, mainly related to distribution transformers, now fall under complete sponsorship of IEEE. The Transformers Committee will continue to have the responsibility for maintenance of these documents, with full indemnification provided by IEEE. A copy of the NEMA letter is included with the Chairs Report as part of the Main Committee Minutes.

The ASC C57 balloting process has ended. During the ASC C57 Committee meeting scheduled for Thursday this topic will be reviewed further, and a discussion on need for future ASC C57 meetings is expected.

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

Due to the termination of the ASC C57 balloting process, there was no report from the IEEE delegation.

3.7 Committee Service Awards – B. K. Patel

Bipin Patel presented his report, which is included in the Committee meeting minutes. Note was made in particular of a new award has been added for the committee, for “Long-standing and Notable Contributions to the Transformers Committee”. This award is to recognize our retiring members after their years of active participation and contributions. The award, in the form of a plaque, has been presented on a selected basis in the recent past and now it is intended to become a regular practice of recognizing our worthy members.

3.8 Chair’s report – H. J. Sim

Jin presented his report, which is included in the Committee meeting minutes. Particular note was made of the new PES publication “Power and Energy” magazine, and of the resolution of the IEEE.NEMA MOU issue with the transfer of sponsorship of selected C57 documents from NEMA to IEEE.

3.9 Vice Chair’s report – K. S. Hanus

Ken was unable to attend this meeting. His report was submitted prior to the meeting, and is included in the Committee meeting minutes. Note was made of the schedule for the next PES General Meetings: July 13-18, 2003 in Toronto; and June 6-12, 2004 in Denver.

3.10 Secretary’s report – D. J. Fallon

The Secretary’s Report was submitted prior to the meeting, and is included here. The Addendum (Clause 3.10.5) reviews action taken at this meeting.

3.10.1 Membership Review

Voting Members – Six new members were added at the last meeting in Oklahoma City:

- James M. Gardner, Delaware Electric
- George E. Henry III, Central Moloney, Inc.
- Paul E. Millward, Instrument Transformer Equipment Corp.
- Robert Thompson, Duke Energy – Energy Delivery Services
- Ron Daubert, Finley Engineering
- Paul Orehek, Richards Manufacturing (renewing former membership)

Welcoming letters have not yet been sent to these, and other recent new members. The Secretary will address this shortly. Action was also taken at Oklahoma City to update Bill Kennedy’s membership status to Emeritus. A notification letter will be sent to Bill from the Committee expressing appreciation for his contributions.

A request has also been received from Linden Pierce asking consideration for Emeritus membership status. Linden intends to continue to participate in balloting and corresponding with the Committee, but he does not anticipate attendance at future meetings. Per the O&P Manual: “The Emeritus Member classification is intended to apply to individuals who have made longstanding and notable contributions to the Committee, but because of a change of personal situations are unable to participate as Voting Members.” We will review this request at the meeting, with the expectation that Linden’s participation, leadership, and dedication to the Committee over many years will be considered.

Review of the membership is continuing with contacts to members who have not been in attendance at any of the four most recent meetings. A letter has been received from Emeritus Member John Easley of GE resigning from the Committee; his name will be removed from the membership roster and a letter of appreciation will be forwarded. Several additional members who have not attended recently have communicated their desire to maintain membership. The status of those who have responded will be reviewed at the Administrative SC Meeting. Phone/mail contact will be attempted with those non-attending members who have not been accessible by e-mail, and membership status recommendations will subsequently be made to the Chair.

Following changes made, but prior to any actions to be reviewed in Raleigh, membership stands at:

Voting Members -		189
Classifications:	Producers -	94
	Users -	52
	General -	43
Life Members		1
Corresponding Members -		1
Emeritus Members -		18

The invitation list has 551 names on it at this time. Several Guests who are no longer attending have been removed, and that review continues also.

3.10.2 New Member Applications

Applications for Committee Membership have been submitted for:

- Tommy P. Cooper, Public Works Commission, Fayetteville
- George J. Reitter, Delta Star, Inc.
- Waldemar Ziomek, Pauwels Canada, Inc.

These applications will be reviewed at the Administrative Subcommittee meeting. An application has also been forwarded by another applicant, but at the moment that application is incomplete and may be deferred for later action. An application is also expected prior to the Raleigh Meeting for Alan Darwin, Alstom T&D Transformers. The Committee welcomes and encourages active participants to become Voting Members of the Committee. Requirements and application forms can be found in the

Organization and Procedures (O&P) Manual, accessible on the Committee website. Subcommittee Chairs are encouraged to recommend new members, and to communicate to applicants awareness that Membership is a privilege gained through active participation in Committee work at the WG and SC level. WG and SC Chairs are reminded also that signing an application sponsoring a new member signifies their understanding that the applicant has met the requirement of active participation for at least one year. New member applications can be forwarded to the Secretary's attention 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. Thanks to all SC Chairs for providing current roster information last November. That information was compiled and submitted to PES for inclusion in the 2003 PES Directory. Discussions will continue on movement towards 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 Minutes of the Oklahoma City Fall '02 meeting were reproduced at a cost of \$1,930.98 for 405 copies and postage costs were \$1,868.45 for 389 mailings (317 within the US and another 72 worldwide), which averages \$9.77 per mailing. While the net cost of Minutes printing and mailing varies for each meeting, the \$10 portion of the registration fee remains a valid nominal fee. Oklahoma City Minutes were mailed on February 26, with expected delivery to domestic US destinations by March 3, and to international destinations by March 7.

In a member vote at the Oklahoma City Meeting the consensus among Members was to move towards electronic posting, rather than printing and mailing, as the primary means of communication of Committee Meeting Minutes in the future, while also maintaining the capability to provide printed Minutes upon request and at a price based on printing and mailing costs. Implementation plans are not complete. One possible option will be to start with the Fall '03 Meeting in Pittsburgh, with request for printed Minutes included as a choice (with cost) at registration. Cost may exceed \$10 as the consensus vote indicates expectation of a smaller printing total. This issue will be discussed further at the Administrative SC Meeting.

We will strive for completion of the Raleigh Meeting Minutes at least 6-8 weeks prior to the next Meeting in Pittsburgh PA. Subcommittee Chairs are requested to submit their SC Minutes by May 9, 2003 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 were put in the format as shown in the present assembled Minutes, with numbering as indicated in the Main Committee Meeting (3/20/03) Agenda. Please indicate total attendance count for each Subcommittee, Working Group, and Task Force meeting in your minutes. Please do not send a copy of the attendance listing for this attendance count. If a SC Secretary, or another SC member is preparing the SC Minutes, please let them know

these details about submitting the minutes for publication. Individual SC Minutes will be posted on the Committee website as soon as they are available.

3.10.5 Addendum to Secretary's Report – Action Taken During Admin. SC Meeting

The Committee notes with sincere regret the passing of recently approved member George Henry, of Central Moloney, shortly before the Raleigh Meeting. With thanks to Greg Anderson's effort, condolences have been sent from the Committee to George's family, together with a note of appreciation for his long years of service to the industry and the Committee, and for the friendship so many of us shared with George.

Linden Pierce's status was changed to Emeritus membership, with the unanimous approval of the Administrative SC members present. A notification letter will be forwarded to Linden, expressing the Committee's appreciation for his outstanding service.

Member Chuck Murray also recently forwarded a letter of resignation from the Committee, and expressed his appreciation to all he had worked with for their professionalism and friendship over the years. A letter of recognition and thanks will be forwarded to Chuck for his years of contribution to the Committee.

Bipin Patel raised a question on the terminology "voting member" as used in the Committee O&P Manual. The terminology was more valid in the past when only members could participate in the balloting process. With the present open ballot process the terminology is no longer valid. The consensus of the group was that the terminology should be changed to simply indicate "member" and that appropriate modifications should be made in the next revision of the O&P Manual, scheduled to take place later this year.

Discussion continued on the need to reduce the membership list by removing non-participating and non-attending members. Contact with several members who had not attended recently but maintained interest in continuing participation led to review of the corresponding category of membership. Corresponding membership was suggested by the Secretary in these contacts as a means to maintain participation. Moving non-attending members to this category would also address the problems recently encountered in achieving quorum when votes are taken at Committee meetings, as corresponding members would not be included in the quorum count. There is no mention of requirements for corresponding membership in the O&P Manual, despite the fact that we presently have one corresponding member. The Secretary suggested that requirements for corresponding membership be defined in general as including all regular membership requirements, with the exception of attendance at meetings. It would be incumbent on corresponding members to maintain contact and participation with WG's and/or SC's in their areas of interest in order to maintain their membership. The proposed changes will be made in the next revision of the O&P Manual, for review and approval of the Administrative SC.

Tom Prevost reported that he learned at the IEEE Standards Board of Governors (BOG) meeting that different Technical Committees define their automatic ballot pools differently. All are subject to the open ballot process, but some limit the size of the automatic ballot pool to those WG members actively

working on a particular project. Smaller ballot pools of interested and involved parties can make the process, including addressing negative ballots, more manageable. Anyone else can still become a member of the ballot group, but to do so they must apply through the IEEE SA website either for inclusion in a specific ballot, or inclusion in groups of ballots by subject matter. At present the Transformers Committee ballot pool consists roughly of our entire invitation list, roughly 500 members, although the Secretary has not regularly communicated updates on this list to our Standards Coordinator (Tom). Tom suggested that we may wish to limit future ballot pools to WG members involved in a specific project, and members of the Committee. This could make the automatic ballot pool more appropriate and also be an incentive to membership. The Chair asked Tom to proceed to investigate this option (the automatic ballot pool consisting of main Committee membership) further. Each specific ballot pool will be supplemented by adding the WG members for that project. Our Standards Coordinator will have the responsibility to keep this automatic pool up to date, and to coordinate with IEEE SA to assure that those who do not participate in any ballots are removed from the pool at an appropriate time.

With future plans for electronic media as the primary means of communication for Committee business, Greg Anderson questioned whether the Invitation list should be maintained into the future. He suggested in future it might be appropriate to only keep track of active Main Committee, WG, and SC members. Programs are under review to modernize the membership database, including varying levels of security access to allow individual members to maintain accuracy of their contact information, and to allow WG and SC Chairs to control their membership lists.

Previously submitted membership applications were reviewed and approved for the new member applicants identified in Section 3.10.2 (Tommy Cooper, George Reitter, and Waldemar Ziomek). Alan Darwin had also submitted a completed application prior to the meeting, and this application was approved also.

The additional application mentioned above remained incomplete at the time of the meeting. Sponsoring signatures had been included, but notation by those signers of participation in those groups for a duration of at least one full year was not yet available. Communication with several members indicated the applicant's active participation, leading to the conclusion that it was appropriate to consider him for membership, but in the absence of three signatures attesting to the minimum one year's apprenticeship by each sponsoring group, the application was deferred for future action. The Secretary pointed out a discrepancy in the O&P Manual, with participation in WG's/SC's indicated on the reverse of the application form, and participation and membership listed in the body of text. The inconsistency will be addressed in the upcoming revision, with intent to more clearly indicate both active participation and membership in the respective WG's and SC's as a pre-requisite for Committee membership. Contact will be made with the applicant, thanking him for his participation, and encouraging continuing participation as part of the process of attaining membership. Our aim is to encourage active participation in the work of the Committee, and encourage all participants to become members of the Committee. The real work of the Committee takes place at the WG and SC level. The membership process is outlined in the O&P Manual. Membership in a WG or SC in many cases is simply a matter of requesting membership, and that membership carries with it the responsibility of participating in the work of the WG or SC. Some of our WG or SC Chairs require participation before granting

membership, and it is within their authority to do so. The primary requirement for Main Committee membership is a year's apprenticeship as an active participant and member of several Working Groups and Subcommittee(s). With that apprenticeship, an applicant completes the application form, found in the O&P Manual, and has it endorsed by three WG or SC Chairs - at least one must be a SC Chair, with that SC sponsoring the applicant. The three signatures attest to the membership and active participation in the respective WG or SC activities for at least that one year's time.

During discussion, one suggestion was made that applicants be required to list projects they had contributed to during their apprenticeship. Alternatively, wording can be added to the application form indicating that sponsoring signatures attest to knowledge of active participation. The wording would serve as a reminder to both applicants and sponsors of their responsibilities in the membership process. As discussion continued, the Secretary advised this alternate approach would be included in the upcoming revision of the O&P Manual for review by the Administrative SC.

The Secretary noted a request made by one of the Tutorial presenters at the Raleigh meeting, asking that consideration be given to either some form of stipend, or perhaps waiving meeting registration fees as a form of recognition of the additional effort involved in preparation and presentation of tutorial material. The request was first submitted to the Meetings Planning SC Chair, and after due consideration was denied on the grounds of difficulty in administering equitably and fairly. The presenter then appealed that request to the Committee officers through telephone calls and in writing. The Committee officers had discussed the possibility of funding members facing budget difficulties in the past, and had decided that the Committee could not in general agree to establish a policy to do so. The Chair prepared a written response, noting the volunteer nature of all Committee work, the budget difficulties that many members must live with, offering encouragement for continuing participation, but regretfully denying the request. The applicant again requested further discussion within our group, indicating that he felt this form of recognition should be considered for future presenters, either at the Administrative SC level or at the Main Committee. A good amount of discussion ensued, reviewing the above points and also noting:

- the increased educational value the tutorial sessions add to our meetings,
- the appropriateness of some form of recognition for tutorial presenters,
- the significant volunteer efforts of many of our participants in working on Committee business and projects, sometimes involving even greater effort than I tutorial preparation,
- the benefits in peer recognition and possibilities of additional business interaction provided by tutorial presentations

At the conclusion of discussion, the consensus of the Administrative SC was in support of the Chair's response, and there was agreement not to set up a policy for monetary recognition of the voluntary efforts of our participants, including tutorial presenters. At the same time, the Awards SC Chair was requested to consider other appropriate means to recognize the valued contributions of those involved in tutorial presentations.

The Committee's plan is that Raleigh will be the last meeting for which printed Minutes will be distributed to all Meeting attendees, and to all Members. Primary communication will be electronically, through the Committee website. Printed copies of Minutes can be made available upon request, and there will be a charge for printing and mailing. Our intent will be to have a checkbox on the registration form for Pittsburgh for a registrant to indicate if they wish printed Minutes to be sent to them. The Secretary plans to communicate this information via the reflector e-mail service, and to send a letter to all Members, as previously printed Minutes had been forwarded to them even if they did not attend the Meeting. The Committee will be advised if there are any changes to this planned implementation of primary electronic communication of Minutes.

3.11 Standards Subcommittee - T. A. Prevost

3.11.1 Standards and coordination activities

Tom Prevost reviewed his report, which is included in the Committee meeting minutes. In addition, items of note during this section of the meeting include:

- NesCom (New Standards Committee) is taking an even harder look at requests for project extensions. Project Authorization Requests (PAR's) have a normal life of four years. A two year extension is readily granted if requested, and one additional extension may be granted, but only upon presentation of compelling reason. Beyond that, virtually no additional extensions will be granted. Review should perhaps be made for projects lasting 7 years or more, with re-grouping under a new PAR with new leadership as one possible solution. The following PAR's are expected to be subject to administrative withdrawal at the next Standards Board Meeting:
 - C57.13 (Standard Requirements for Instrument Transformers) PAR - The project has been ongoing for nearly 8 years, and no further extensions will be granted. Reaffirmation should be considered by years end.
 - PC57.113 (Recommended Practice for Partial Discharge Measurement in Liquid-Filled Transformers and Shunt Reactors) PAR will be withdrawn also. In the case of this document, reaffirmation was chosen rather than revision, and the reaffirmation has been successfully completed.
 - PC62.91 (Standard Requirements, Terminology, and Test Procedures for Neutral Grounding Devices) has been taken over by the Transformers Committee. PAR for PC62.91 will be withdrawn, and this revision work will be taken up under a new PAR for project PC57.32.
- A Corrigenda was prepared, balloted, and approved for the C57.91 Loading Guide to correct some specific errors in the document, but disapproved a reaffirmation of the base document because of the approval of the Corrigenda. Either the base document will have to be revised to include the Corrigenda corrections (opening it to general revision in other areas also), or the base document and Corrigenda will have to be subjected to reaffirmation together.
- SC and WG Chairs are advised to pay particular attention to the listing of PAR's (Project Approval Requests) that are nearing expiration, and to take appropriate action to either complete

or request extensions, if necessary, through the on-line process available through IEEE. Note PC 57.12.01, PC57.130, PC57.140, and PC57.141 will expire at the end of 2003.

- Note also from the Report over 15 standards documents due for five year review by the end of 2003. Appropriate action is required for these documents. If revision is in process, extension of PAR should be requested if revision ballot would not be complete by years end. Otherwise work should promptly begin on reaffirmation in order to avoid administrative withdrawal.

3.11.2 Documents submitted to the Standards Board

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

3.12 Round-Table: Subcommittee Activities - Subcommittee Chairs

3.12.1 Audible Sound and Vibration - Jeewan Puri

Jeewan commented that definition of the role of “Corresponding” member, and encouraging participation through correspondence, may help to alleviate some of the difficulties all SC’s experience with getting sufficient participation at meetings to keep work moving forward.

3.12.2 Bushings - F. E. Elliott

There was no representative of the Bushing SC present, and subsequently no report.

3.12.3 Dielectric Tests - L. B. Wagenaar

Loren reported that in the continuing effort to provide sufficient depth of leadership in WG’s three WG’s within the Dielectric Test SC now have secretaries.

3.12.4 Distribution Transformers – Ron Stahara, for Ed Smith

Ron noted the contributions George Henry had made, and forwarded the appreciation of George’s family, and of George’s associates at Central Moloney, for the condolences sent by the Committee.

Ron also reported that the recirculation ballot on C57.12.34 closed on March 9. With a 90% ballot return and 79% affirmative votes, the ballot may technically be successful, even with 16 negative ballots. The negative ballots deal with metrification concerns, and as a result there is uncertainty on how to proceed. The Chair requested that this discussion be included during review of metrification issues later in the meeting.

3.12.5 Dry-Type Transformers – Chuck Johnson

The Chair noted that Wes Patterson had regretfully forwarded his resignation as Chair of the Dry-Type SC, due to increasing difficulty in including these responsibilities within the framework of his present workscope. The Chair expressed the thanks of the Committee for Wes' contributions, and appointed Chuck Johnson as the new SC Chair.

Chuck had no items to report to the Administrative SC.

3.12.6 HVDC Converter Transformers & Smoothing Reactors - Richard Dudley

Richard reported that the standards under this S.C. are part of an evolving technology area. Current efforts are focused on possible future additions/revisions to IEEE C57.129 and IEEE 1277. Work areas include:

- Drafting of an Annex on transformers used in voltage source converter based HVDC schemes.
- Drafting of an Annex on overloading of converter transformers; emphasis on test issues.
- Measurement of losses of converter transformers.
- Feedback from HVDC projects and use of standards; converter transformers and smoothing reactors.

Richard provided a warning to all SC Chairs, based on the serious problems in reaffirmation of C57.21 due to errors introduced in the balloted document through character recognition during scanning by IEEE. Document sponsors are urged to check the documents carefully. IEEE has indicated they will provide additional editorial overview. We have also changed the process to have a Draft forwarded back to the WG Chair, or other appropriate person guiding the reaffirmations, after any scanning – for final review prior to balloting. These changes should go a long way towards addressing these problems, but we should remain vigilant. Questions were also asked on whether IEEE is using appropriately sophisticated programs to avoid such problems in future.

Richard also expressed significant concern with a seemingly growing problem, when conducting Committee business via e-mail, with individuals who simply do not respond. Even recognizing how busy most of us are, and how much e-mail we receive, he urges that we all be mindful of our responsibility to respond to Committee issues and correspondence. If work or personal schedules preclude thorough response, at least a note back that the correspondence has been received, and that the work should proceed without that individual's response, is in order. The problem is magnified when negative balloters do not respond to subsequent correspondence. The group concurred, and the Chair will plan to make an announcement in the Main Meeting appealing for all participants in our work to be mindful of these professional responsibilities.

3.12.7 Instrument Transformers - J. E. Smith

Jim reported that he had received a request for Standards interpretation, and asked how to proceed. The Chair advised that the interpretation response should be prepared within the SC, and then submitted to the Administrative SC for review and approval. Once approved, the interpretation response can be forwarded back to IEEE for ultimate reply to the requester.

3.12.8 Insulating Fluids – F. J. Gryzkiewicz

SC representation arrived in Raleigh subsequent to the Administrative SC Meeting, and there was therefore no report at the meeting.

3.12.9 Insulation Life – D. W. Platts

No items to report to the Administrative SC.

3.12.10 Performance Characteristics – R. S. Girgis

Ramsis noted that several preliminary conference calls had been held and that planning was proceeding for the expanded tutorial session on core excitation to be held at the Pittsburgh Meeting, with participation by both manufacturers and utilities.

3.12.11 Power Transformers - E.G. Hager

No items to report to the Administrative SC.

3.12.12 Underground Transformers and Network Protectors – C. Niemann

Carl noted that the metrification issue was on the agenda for discussion later in the meeting. He reiterated the importance of resolution of this issue in a manner recognizing the safety concerns of a large number of users of the product standards, and expressed dismay that he had not yet seen a response from IEEE SA or the BOG related to the Committee's concerns. The Chair indicated there would be further discussion of this issue later in the meeting.

3.12.13 Meetings & Planning - Greg Anderson

As indicated, Greg's report is included in the Committee meeting minutes. No other items to report to the Administrative SC.

3.13 EEE Standards Activities – Naeem Ahmad

Naeem arrived towards the end of the meeting, and reported on the following items:

- Ongoing review of the metrification policy

- Electronic balloting, and IEEE's work on a new more user friendly process to be in place sometime in 2004
- Interactive, or Smart, Standards Development – IEEE is looking for interested WG's to be involved in development of this new process for standards development.

3.14 Old Business

3.14.1 Metrification Policy

Tom Prevost and Steve Shull provided an update on status of the ballot on C57.12.34, as a test case for Committee safety concerns with IEEE strict metrification policy. The original ballot, without any non-metric units, resulted in an approximate 35% negative ballot response. Steve then attempted, through normative annexes and footnotes within the document, to address the negative ballots within a framework hoped to be acceptable to IEEE. This recirculation was technically successful, with 79% affirmative ballots. It is not normal, however, for the Committee to forward a document for approval with 21% negative ballots. In addition, the Metric Standards Coordinating Committee (SCC14) did not approve of the compromise document as written, as they judge it does not meet the present metrification policy.

Tom also reported that Judy Gorman, Managing Director of IEEE SA, had discussed this subject at a recent BOG Meeting. There is at least some understanding that the metrification issue is significant, and that there were concerns not only from PES, but from the Industrial Applications areas as well. There seems also to be recognition that the user community concerns must be addressed.

We have attempted to compromise, within the framework provided by IEEE. The result is a document that many users feel to be cumbersome and unworkable due to unwieldy inclusion of dual measurements, and which SCC14 does not approve. The ballot is technically successful, but there is concern within the WG and Committee for submitting a document with so many negatives to RevCom. The next step will be to bring this issue before the Standards Board in June to express our concerns and make our case for a specific exception to the metrification policy, for use of dual dimensions for this document. We are hopeful that this specific exception will be approved, and that it can subsequently be used as a precedent for documents with similar concerns

The Chair advises that we should proceed at this point in time as if IEEE SA will approve our request for use of dual dimensioning within the document body, and any documents presently being worked on where the same concerns are present the dual dimensioning should be used.

There were no other items of old business.

3.15 New Business

3.15.1 Thursday Morning Main Meeting Format, Function, and Value

As this subject was brought up at the previous meeting, the Chair had asked Administrative SC members to provide specific recommendations on improvement of the Thursday meeting structure and content – to be forwarded for review at this Meeting. Unfortunately there was very little input provided prior to this meeting. Discussion continued.

Some changes were suggested for the Main Meeting in Raleigh, moving some administrative areas after the technical SC reports, but it was recognized that there still was significant room for improvement to make the Thursday meeting provide significant value to attendees and their sponsoring organizations. Each agenda item in the Main Meeting should be reviewed from the perspective of the value it brings to the meeting, and whether there are ways to improve its value. The overall. The Chair commented to all Administrative SC members that it is understandably easier to recognize deficiencies in a process, and reminded all again that what is really needed is the more difficult task to provide specific constructive suggestions for improving the format and content of the Main Meeting. Input from all members and guests is encouraged, and should be forwarded to either the Chair, the Secretary, or the Meetings Planning SC Chair, prior to the Pittsburgh Meeting.

3.15.2 Subcommittee Leadership – Co-Chair or Vice-Chair

Recently support for SC Chairs had been designated through appointment of Co-Chairs for several SC's. The question was raised as to whether this terminology created some confusion as to whether either or both Co-Chairs were required to address SC issues. Greg Anderson pointed out that the terminology Co-Chair implies shared responsibility, and Vice-Chair more clearly implies a redundancy of leadership, with the Vice-Chair taking full responsibility for SC issues when the Chair was not present or available, and providing a support role when the Chair is present. The Secretary pointed out that the O&P Manual uses the terminology Vice-Chair, rather than Co-Chair. With some further discussion, the decision was made, by vote of Administrative SC members, to use the terminology Vice-Chair, as used in the O&P Manual. The responsibility will be one of providing redundancy of leadership, rather than shared leadership. All SC Chairs are urged to consider designating a SC Vice-Chair and a Secretary

3.15.3 Recognition of Members with Significant Contributions

Award Chair Patel asked for some additional discussion on awards for members who contribute significantly to the work of the Committee. While it is appropriate to provide encouragement and recognition to those participating, concern was expressed that an overabundance of plaques or certificates might lessen the significance of such recognition. The Chair asked for discussion on whether the Administrative SC should provide some guidelines to the Awards Chair for recognition, or require the Awards Chair to provide that guidance. One particular area in question relates to tutorial presenters. The Secretary suggested that tutorial presenters might receive a letter of recognition from one of the Committee officers. Absent specific further recommendations during the meeting, this one item will be considered, the Awards Chair will continue with primary responsibility for recommendations

of awards, and Administrative SC members are encouraged to give further thought on enhancing recognition for participants. Any recommendations should be provided to Bipin for review.

As noted, Peter Balma had requested the opportunity to address the Administrative SC on this the topic of recognition and awards also. Peter made a presentation several meetings back on the direction the Committee was going, with suggestions on how to enhance the Committee's capability to meet its goals and objectives of enhancing membership, increasing participation, improving value, and providing recognition. He noted that the Committee had made meaningful progress in several areas, and wished to visit again the area of recognition. Recognition is a complicated issue in management of personnel back where each of us works, and it is a complicated issue in encouraging and motivating our volunteer workforce in the Committee to achieve all we can. Different people are motivated by different forms of recognition, and we should be continually on alert for various methods, both large and small, to provide that motivation. Peter provided specific ideas that might be considered, including some form of recognition for:

- New member recognition award – for relatively new members with significant contribution, to encourage more participants to apply for membership
- Technical contribution – for participants providing very meaningful research or presentation that provides guidance and direction for the work of a particular WG.
- SC Chair's award – at the discretion of the SCV Chair, to recognize significant contribution to the work of the SC
- WG of the Year award – perhaps to recognize our WG nominee for the IEEE award, or other significant WG, even if they do not receive the IEEE award
- Tutorial recognition – a certificate to bring back home to show their management that they are participating actively and that their contribution is recognized as being of value
- SC or WG Secretary award – in recognition of the effort necessary when a secretary fulfills their responsibility well.
- Chair's Award – for the Committee Chair to recognize an individual for significant contribution during the course of the Chair's tenure as a Committee officer
- Transformer Committee Achievement award – again, at the discretion of the Chair, when an individual's contributions over several years warrant specific recognition.

The Chair thanked Peter for these suggestions, and asked all to provide additional thoughts on recognition. Awards Chair Patel will review all suggestions as he plans for future recognition, and will seek the comments of the Administrative SC as he proposes additional specific awards.

There were no other items of New Business for the Administrative SC.

3.16 Adjournment

Chairman Sim adjourned the meeting at 5:47 p.m.

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>
2004	San Diego, CA	Edinburgh, Scotland, UK	Hanus
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

4.0 Vice Chair's Report – K.S. Hanus

The following are reports on activities of PES Committees on which the Vice Chair serves as Committee representative. There has been no general meeting since Oklahoma City but a planning meeting was held March 3, 2003 to plan the technical program for the general meeting in Toronto this summer.

4.1 PES General Meeting in Toronto – Technical Session Tracks

The IEEE Power Engineering Society (PES) 2003 meeting will be held at the Sheraton Centre in Toronto, Canada from July 13-18th, 2003. This power engineering conference will bring together practicing power engineering engineers and academics from around the world. The aim of the conference is to provide, share, and discuss various issues and developments in the field of electrical power engineering.

The theme of the meeting is “**Empowering Ideas**”. Preferred topics for the meeting are as follows:

Track 1 Asset Management, covering such topics as:

- optimizing the use of assets (including operation, maintenance, refurbishment, upgrading, replacement, etc);
- maintenance philosophies and implementation strategies;
- system capability enhancements;
- life-cycle management strategies;
- managing assets for customer satisfaction
- impact of aging assets on system and investment planning;
- benefits of wide area control for improving power system dynamic performance.

Track 2 Risk Management, covering such topics as:

- security of IT systems;
- asset physical security;
- control centers- distributed vs. centralized; contingency capability;
- managing the financial risks of Performance Based Rates;
- the risk-cost trade off in transmission and/or in distribution system design.

Track 3 Telecommunication, Information, and Control, covering such topics as:

- on-line system security assessment;
- communications systems;
- communications protocols;
- transmission and distribution dispatch and/or control systems (changes needed to provide maximum value in a wholesale/retail open access environment)
- wide area stability and control.

Track 4 Industrial Power Distribution, covering such topics as:

- power quality & conditioning;

- load management;
- Hi Del – Internet Hotels (telco Hotels, Web hosting sites);
- DG interconnection
- microturbines;
- custom power equipment

Track 5 Developments in Power Engineering Technologies, covering such topics as:

- solutions to minimize environmental impacts;
- functional specification and solution evaluation criteria;
- development in power applications of superconductivity;
- developments in diagnostic techniques;
- innovative protection and/or control technologies and methods;
- developments in communications and information technology for power system applications
- developments in load management and controls;
- power electronic controllers/devices (PEC's or FACTS) for power system applications.

4.2 Transformers Committee Technical Sessions in Toronto

There will be two paper sessions sponsored by the Transformers Committee, one on Wednesday afternoon and one on Thursday morning. There will be a total of 7 Transactions papers and 3 session papers.

Respectfully submitted, K.S. Hanus, Vice Chair

5.0 Transformer Standards – T. A. Prevost

The Standards Sub Committee met on Wednesday March 19, 2003.

The Minutes from Oklahoma City Meeting were approved as written.

5.1 Reports of WG's:

5.1.1 C57.12.00, C57.12.90 - Subhash Tuli, WG Chair

Both C57.12.00 and C57.12.90 have been balloted for revision. This ballot resulted in several negatives which have been given to the appropriate technical sub committee for resolution. One large issue is metrification. Many balloters feel that dual dimensions are needed. We discussed the two year revision cycle of these standards. The sub-committee felt that this was still OK.

5.1.2 PC57.144 WG on Guide for Metrification of Transformer Standards – Dudley Galloway, WG Chair

The guide is basically complete. Will send out for ballot before the next committee meeting. This is a

good tool for metric conversion units and accuracy.

5.1.3 Reaffirmation of IEEE 62: IEEE Guide for Diagnostic Field Testing of Electric Power Apparatus - Part 1: Oil Filled Power Transformers, Regulators, and Reactors - Wally Binder, WG Chair

This standard was formerly maintained by the Power System Instrumentation and Measurement Committee. The transformer committee has agreed to take over maintenance of this standard. The reaffirmation ballot closes on April 16th.

5.2 Old Business

5.2.1 C57 Standards Collection

IEEE sold ~100 CDs at the last Transformers Committee meeting. The consensus is that we should continue to offer CDs which are updated at a preferred period of two years.

5.2.2 Metrification of Transformer Standards

This issue centers around metric issues in PC57.12.34 which is in the ballot stage. PC57.12.34 was recirculated with inch-pound equivalent units in annexes and a normative annex which contained inch-pound tables as reference. This ballot passed with 79% affirmative votes but with a negative from SCC14 for having inch-pound units in a normative annex (should be informative). Everyone agreed that this document is not in the format that it needs to be in to have a clear, concise standard with no possibility for confusion of units which could lead to safety issues. We will submit PC57.12.34 with dual dimensioning and request an exception to the metric policy to the standards board.

5.2.3 C57.12.00 Proposed Changes to Temperature Rise

The insulation life sub-committee is investigating changes to the temperature rise values in C57.12.00. This issue will be addressed in the Insulation Life Subcommittee. However, should there be exceptions added to C57.12.00 for issues such as other temperature rise values these will be put in an annex rather than added to the main body of the document.

5.3 Standards Activities Since the October, 2002 Meeting

The Standards Subcommittee Chair's March 16, 2003, Report to the Committee, presented at the Administrative SC Meeting, follows. The Attachment referenced is included at the end of the Minutes.

DATE: March 16, 2003

TO: Members of IEEE Transformers Committee
FROM: Tom Prevost, Standards Subcommittee Chair
SUBJECT: Standards Activities since the October, 2002 Meeting

TRANSFORMERS STANDARDS AND COORDINATION ACTIVITIES

The transformers standards status is given with two attachments:

(Secretary's Note: Attachment 2, Coordination Activities, has been discontinued as there are only a small number of such activities.)

Attachment 1 is a list of all the C57 standards, including ANSI C57 standards, sorted by Subcommittee names. It contains a listing of the projects for which a Subcommittee is responsible, and coordination activities with other PES Committees. The standards that are not assigned yet, or do not belong to the Transformers committee, are listed under the Standards Subcommittee. For the publication of the Transformers Committee minutes, this attachment will be sorted by Subcommittee names, and each section will accompany the corresponding Subcommittee report.

DOCUMENTS SUBMITTED TO THE STANDARDS BOARD

IEEE-SA Standards Board
New Standards Committee (NesCom)
Recommendations

23 October 2002

NEW PARS

PC57.146 (PE/TR) Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers
Recommendation: Approve new PAR as modified until December 2006.

REVISED PARS

PC57.13.5 (PE/TR) Trial-Use Standard of Performance and Test Requirements of Instrument Transformers of a Nominal Voltage of 115 kV and Above
Recommendation: Approve revised PAR until December 2003.

FOR REVISIONS OF STANDARDS

10 December 2002

TARGET EXTENSION REQUESTS

PC57.12.25 (PE/TR) Standard for Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage, 34500 GrdY/19920 Volts and Below, Low Voltage, 240/120 Volts; 167 kVA and Smaller - Requirements
Recommendation: Defer until March 2002 pending the receipt of the appropriate request for an extension.

PC57.13 (PE/TR) Standard Requirements for Instrument Transformers
Recommendation: Defer until March 2002 pending the receipt of the appropriate request for an extension.

PC57.19.00 (PE/TR) Standard General Requirements and Test Procedure for Power Apparatus Bushings
Recommendation: Defer until March 2002 pending the receipt of the appropriate request for an extension.

PC57.104 (PE/TR) Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers
Recommendation: Approve target extension request until December 2004. Last extension request.

PC57.133 (PE/TR) Guide for Short Circuit Testing of Distribution and Power Transformers
Recommendation: Defer until March 2002 pending the receipt of the appropriate request for an extension.

PARS TO BE ADMINISTRATIVELY WITHDRAWN

PC57.113 (PE/TR) Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors
Recommendation: Approve administrative withdrawal.

PC62.91 (PE/SPD) Standard Requirements, Terminology, and Test Procedure for Neutral Grounding Devices
Recommendation: Approve administrative withdrawal.

WITHDRAWN PARS

PC57.139 (PE/TR) Guide for Dissolved Gas Analysis in Transformer Load Tap Changers
Recommendation: Approve request for withdrawal.

NEW PARS

PC57.139 (PE/TR) Guide for Dissolved Gas Analysis in Transformer Load Tap Changers
Recommendation: Approve new PAR until December 2006.

REVISED PARS

PARS FOR REVISIONS OF STANDARDS

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

Recommendation: Approve PAR for the revision of a standard until December 2006.
Joe would like a pointer back to the old number - IEEE Std 32. Check with staff.

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

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

CHANGE IN PROJECT SPONSORSHIP

PC62.91 Standard Requirements, Terminology, and Test Procedure for Neutral Grounding Devices

Recommendation: Approve transfer of sponsorship from Power Engineering/Surge Protective Devices Committee to Power Engineering/Transformers Committee.

IEEE-SA STANDARDS BOARD REVIEW COMMITTEE (RevCom)

RECOMMENDATIONS

10 December 2002

NEW

PC57.91-1995/Cor 1/D2.0 (PE/TR) Corrigenda for C57.91-1995, Guide for Loading Mineral-Oil-Immersed Transformers

Recommendation: APPROVE

REAFFIRMATION

637-1985 (R1992) (PE/TR) IEEE Guide for the Reclamation of Insulating Oil and Criteria for Its Use

Recommendation: APPROVE

C57.19.03-1996 (PE/TR) IEEE Standard Requirements, Terminology, and Test Code for Bushings for DC Applications

Recommendation: APPROVE

C57.91-1995 (PE/TR) IEEE Guide for Loading Mineral-Oil-Immersed Transformers

Recommendation: Disapprove, but instead grant a 2-year extension to allow time for the Sponsor to submit a PAR for revision or to reaffirm the base document plus the corrigenda

C57.113-1991 (PE/TR) IEEE Guide for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors

Recommendation: APPROVE

5-YEAR REVIEW OF STANDARDS

32-1972 (R1997) (PE/SPD) IEEE Standard Requirements, Terminology, and Test Procedures for Neutral Grounding Devices

Currently, the revision project is in the process of being transferred to PE/TR from PE/SPD. PE/TR has submitted a PAR for revision, with the new project number being PC57.32. However, PE/TR will complete a reaffirmation prior to the revision.

Recommendation: Extend until December 2003.

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2003.

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2003.

C57.13-1993 IEEE Standard Requirements for Instrument Transformers

Sponsor will submit a PAR extension request to NesCom for revision project PC57.13.

Recommendation: Extend until the expiration of the PAR for PC57.13. [NesCom deferred to March 2003]

C57.19.00-1991 (R1997) IEEE Standard General Requirements and Test Procedure for Outdoor Power Apparatus Bushings

Sponsor has submitted a PAR extension request to NesCom for revision project PC57.19.00.

Recommendation: Extend until the expiration of the PAR for PC57.19.00. [NesCom deferred to March 2003]

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2003.

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2003.

C57.104-1991 IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers

Sponsor has submitted a PAR extension request to NesCom for revision project PC57.104.

Recommendation: Extend until the expiration of the PAR for PC57.104. [December 2004]

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

2-year extension sought by Sponsor. Sponsor states that a reaffirmation ballot will be initiated.

Recommendation: Extend until December 2004.

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2003.

Projects reaching end of life:

This letter is to advise you that the projects listed below will expire at the end of 2003 and action will be required.

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

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

- PC57.140 Life Extension of Power Transformers

- PC57.141 Guide for the Application of Load Tap Changers

If the projects will not be submitted to RevCom in time for the December 2003 meeting, you have the following options:

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

2. Request withdrawal of the projects.

Please advise me in writing of the action that should be taken. This information will be placed on the agenda of the next scheduled NesCom meeting (based upon the date I receive the request), and NesCom will make its recommendation based upon the information provided.

If there is no response to this letter by 21 October 2003, the projects will be recommended for administrative withdrawal at the 10 December 2003 IEEE-SA Standards Board meeting.

Standards due for 5 Year Review

PE/TR has some standards that are due for their 5-year review by the end of 2003. {Standards have a five-year lifespan.} An action is required of the Sponsor. Available choices:

- a) reaffirm
- b) revise
- c) extend
- d) withdraw

I MUST RECEIVE A RESPONSE BY THE 21 OCTOBER 2003 SUBMITTAL DEADLINE (FOR THE DECEMBER 2003 STANDARDS BOARD MEETING SERIES). IF NO RESPONSE IS RECEIVED, THE STANDARDS IN QUESTION WILL BE PLACED ON THE AGENDA FOR ADMINISTRATIVE WITHDRAWAL.

If the Sponsor chooses to revise or reaffirm and the action cannot be completed by the submittal deadline, please send me an email requesting an extension of the life of the current standard and notification of the actions that are being taken. {Please let me know approximately when the reaffirmation will be submitted; or when the PAR for revision will be submitted to NesCom and the estimated completion date for the revision project.}

If there is no further interest in a standard and the Sponsor wishes it to be withdrawn, you do not need to ballot. It will be administratively withdrawn in December 2003. {Please note that standards that are administratively withdrawn can no longer be reinstated via reaffirmation. The only method for reinstating an administratively withdrawn standard is to initiate a revision process, starting with a PAR.}

The standards in question are:

32-1972 (R1997) IEEE Standard Requirements, Terminology, and Test Procedures for Neutral Grounding Devices

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

C57.12.01-1998 IEEE Standard General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and/or Resin Encapsulated Windings

[Note: The PAR for revision project PC57.12.01 is due to expire this year.]

Please contact the NesCom Administrator, Jodi Haasz {j.haasz@ieee.org} for actions on PARs.]

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

C57.12.56-1986 (R1998) IEEE Standard Test Procedure for Thermal Evaluation of Insulation Systems for Ventilated Dry-Type Power and Distribution Transformers

C57.12.60-1998 IEEE Guide for Test Procedures for Thermal Evaluation of Insulation Systems for Solid Cast and Resin-Encapsulated Power and Distribution Transformers

C57.13-1993 IEEE Standard Requirements for Instrument Transformers
[Note: The PAR for revision project PC57.13 is due to be withdrawn at the March 2003 NesCom meeting.]

C57.18.10-1998 IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers

C57.19.00-1991 (R1997) IEEE Standard General Requirements and Test Procedure for Outdoor Power Apparatus Bushings
[Note: A PAR extension request is on the March 2003 NesCom agenda.]

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

C57.110-1998 IEEE Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents

C57.117-1986 (R1998) IEEE Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems

C57.121-1998 IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers

C57.125-1991 (R1998) IEEE Guide for Failure Investigation, Documentation, and Analysis for Power Transformers and Shunt Reactors

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

C57.138-1998 IEEE Recommended Practice for Routine Impulse Test for

Distribution Transformers

Ballot Status:

Std. C57.12.58	Reaff	PE/TR	20-Jan-2002	8-Feb-2002	47	97%	3%	0%	Electronic
C57.106/D7 Rev	Recirc	PE/TR	17-Jan-2002	13-Feb-2002	136	95%	4%	1%	Paper
PC57.12.23/D4	Rev	PE/TR	21-Jan-2002	19-Feb-2002	70	100%	0%	4%	Electronic
Std.C57.124	Reaff	PE/TR	22-Jan-2002	20-Feb-2002	58	97%	2%	2%	Electronic
Std.C57.131	Reaff	PE/TR	23-Jan-2002	21-Feb-2002	90	95%	4%	4%	Electronic
PC57.12.01/D3	Rev	PE/TR	24-Jan-2002	22-Feb-2002	80	96%	4%	1%	Electronic
C57.12.80/D4 Rev.	Recirc	PE/TR	8-Feb-2002	1-Mar-2002	155	90%	3%	3%	Paper
Std.C57.12.35	Reaff	PE/TR	28-Jan-2002	4-Mar-2002	77	95%	5%	0%	Paper
C57.21	Reaff	PE/TR	7-Feb-2002	25-Mar-2002	78	91%	6%	3%	Paper
PC57.12.34/D8 Rev	Rev	PE/TR	1-Apr-2002	13-May-2002	90	68%	32%	3%	Electronic
PC57.12.31/D1.4	New	PE/TR	10-Apr-2002	22-May-2002	53	82%	18%	3%	Electronic
PC57.12.32/D4.3	New	PE/TR	12-Apr-2002	24-May-2002	62	100%	0%	4%	Electronic
PC57.104/D10	Rev	PE/TR	12-Apr-2002	24-May-2002	129	87%	13%	6%	Electronic
Std. C57.19.03	Reaff	PE/TR	11-Jun-2002	22-Jul-2002	53	97%	3%	5%	Electronic
PC57.13.5/D14.04	New	PE/TR	12-Jun-2002	24-Jul-2002	59	90%	10%	3%	Electronic
Std. 637	Reaff	PE/TR	14-Jun-2002	26-Jul-2002	77	95%	5%	4%	Electronic
PC57.12.90/D2	Rev	PE/TR	17-Jun-2002	30-Jul-2002	139	93%	7%	4%	Electronic
PC57.12.00/D2	Rev	PE/TR	17-Jun-2002	1-Aug-2002	160	86%	14%	7%	Electronic
Std. 1276	Reaff	PE/TR	6-Sep-2002	5-Oct-2002	98	98%	2%	3%	Electronic
Std. C57.113	Reaff	PE/TR	6-Sep-2002	5-Oct-2002	102	97%	3%	3%	Electronic

PC57.13.5/D15	Recirc	PE/TR	1-Oct-2002	12-Nov-2002	59	96%	4%	1%	Electronic
PC57.19.00/D6	Rev	PE/TR	15-Oct-2002	13-Nov-2002	89	95%	5%	2%	Electronic
C57.145/D6	New	PE/TR	8-Nov-2002	7-Dec-2002	118	79%	21%	4%	Electronic
PC57.12.34/D9	Recirc	PE/TR	7-Feb-2003	9-Mar-2003	90				Electronic

2003 Invitation to Ballot

Std.62 REAFF	PE/PSIM	Wallace B Binder	02/05/2003	03/07/2003	625	Electronic Invitation			
Std.C57.110 REAFF	PE/TR	Richard P Marek	01/23/2003	02/22/2003	844	Electronic Invitation			

2002 Invitation to Ballot

Std.C57.12.35 REAFF	PE/TR	George E Henry	11/26/2001	01/07/2002	552	Paper Invitation			
PC57.12.34 REV	PE/TR	Stephen Shull	02/08/2002	03/10/2002	539	Electronic Invitation			
PC57.12.32	PE/TR	Robert C Olen	02/08/2002	03/14/2002	539	Electronic Invitation			
PC57.12.31	PE/TR	Robert C Olen	02/08/2002	03/14/2002	539	Electronic Invitation			
PC57.104 REV	PE/TR	Frank W Heinrichs	02/11/2002	03/12/2002	539	Electronic Invitation			
PC57.13.5	PE/TR	Joseph Ma	04/15/2002	05/15/2002	550	Electronic Invitation			
Std.C57.19.03 REAFF	PE/TR	Fred E Elliott	04/24/2002	05/23/2002	553	Electronic Invitation			
PC57.12.00 REV	PE/TR	Subhash C Tuli	04/26/2002	05/26/2002	553	Electronic Invitation			
PC57.12.90 REV	PE/TR	Subhash C Tuli	04/26/2002	05/27/2002	553	Electronic Invitation			
Std.637 REAFF	PE/TR	James A Thompson	05/01/2002	05/31/2002	552	Electronic Invitation			
Std.C57.113 REAFF	PE/TR	Mark D Perkins	07/30/2002	08/29/2002	579	Electronic Invitation			
Std.1276 REAFF	PE/TR	Michael A Franchek	07/31/2002	08/30/2002	580	Electronic Invitation			

PC57.19.00 REV	PE/TR	Keith Ellis	07/31/2002	08/30/2002	580	Electronic Invitation
PC57.145	PE/TR	Barry L Beaster	09/09/2002	10/09/2002	577	Electronic Invitation

NEXT STANDARDS BOARD MEETINGS AND SUBMITTAL DEADLINES

Meeting date Deadline for Submittal of PAR (1) or Draft Standard (2)

March 18, 2003	February 7, 2003
June 10, 2003	May 2, 2003
Sept. 11, 2003	Aug. 1, 2003
Dec. 8, 2003	Oct. 21, 2003

- (1) A PAR must be sent to the Standards Subcommittee Chair before the stated deadline.
- (2) Standards must be submitted directly to the IEEE Standards Department by the Working Group Chair before the stated deadline to be considered at the next Standards board Meeting.

Note:

The PAR form has been revised. To locate the current PAR form please go to <http://standards.ieee.org/guides/par/index.html>. Also, a new Target Extension Request form is to be used for all extension requests for PARs and is located at <http://standards.ieee.org/guides/par/extension.html>.

6.0 Recognition and Awards – B.K.Patel

6.1 Certificates of Appreciation

Certificates of Appreciation have been obtained for the following persons:

<u>Name</u>	<u>Service Rendered</u>
Robert Olen	Chair, Working Group for C57.12.32 - Standard for Submersible Equipment - Enclosure Integrity
Linden W. Pierce	Chair, Working Group for Revision of C57.91 - Guide for Loading Liquid-Immersed Transformers
Raymond W. Nicholas	Host, Spring 2003 Meeting, Raleigh, NC

Wes Patterson	Chair, Dry-Type Transformers Subcommittee
John A. Ebert	Long-standing and Notable Contributions to the Transformers Committee
Robert L. Grubb	Long-standing and Notable Contributions to the Transformers Committee
William N. Kennedy	Long-standing and Notable Contributions to the Transformers Committee
Michael I. Mitelman	Long-standing and Notable Contributions to the Transformers Committee
Linden W. Pierce	Long-standing and Notable Contributions to the Transformers Committee
HVDC WG Recognition	Certificate of appreciation will be presented to members, see note below in 6.2

6.2 Nominations for IEEE, PES, and Technical Council Awards

The following award nominations were submitted this period as reported in my last report:

- Transformers Committee for Technical Council Technical Committee Distinguished Service Award
 -- T&D Committee won the award. We were second in the grading.
- PES Working Group Award (Prize Standard):

HVDC Converter Transformers and Smoothing Reactors Subcommittee – IEEE 1277-2000 - General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission.

-- IEEE Std. 691-2001 (IEEE Guide for transmission structure foundation design and testing) won the award. Ours came second.

- Technical Committee Working Group Recognition Award:

HVDC Converter Transformers and Smoothing Reactors Subcommittee – IEEE 1277-2000 - General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission.

-- The following members will receive certificates of appreciation:

Richard F. Dudley	Dennis Allan	Raymond Allustiari
Michael Altman	Peter Balma	Gene Blackburn
Jack Christofersen	Joseph Cultrera	Vincent Dahinden
Dan De La Cruz	Fred Elliott	Joseph Foldi
Alan Forrest	Derek Foster	Peter Heinzig
Keith Highton	Anthony Jonnatti	Lars-Erik Juhlin
Bill Kennedy	Sheldon Kennedy	Frank Lewis
Nigel McQuin	Klaus Papp	Wesley Patterson
Paulette Payne	Carlos Piexoto	Greg Polovick
Einar Purra	Pierre Riffon	Michael Sharp
Georges Vaillancourt	Joe Watson	Gene Wolf

Waldemar Ziomek

6.3 Awards – General

The following is a listing of various awards available:

AWARD	NOMINATION DEADLINE	NOMINATION SENT To
PES Prize Paper Award	***	Mohammad Shahidehpour
PES Working Group Award (Technical Report)	***	Mohammad Shahidehpour
PES Working Group Award (Standard or Guide)	***	Mohammad Shahidehpour
“High Interest” Paper	***	Noel Schulz
Alfred Nobel Intersociety Award	***	Noel Schulz
Technical Committee Prize Paper Award	***	Noel Schulz
Technical Committee Distinguished Service Award	***	Noel Schulz
Tech. Com. Working Group Recognition Award	***	Noel Schulz
IEEE Prize Paper Award (W.R.G. Baker)	April 1	Mohammad Shahidehpour
IEEE Prize Paper Award (Donald G. Fink)	April 1	Mohammad Shahidehpour
IEEE Prize Paper Award (Browder J. Thompson)	April 1	Mohammad Shahidehpour

*** Will be decided at the general meeting in July 2003.

6.4 Awards – New

As you may have noticed in the above listing of certificates of appreciation, a new award has been added for the committee, “Long-standing and Notable Contributions to the Transformers Committee”. This award is to recognize our retiring members from the committee after their several years of active participation and contributions. A plaque has been presented on a selected basis in the recent past and now it is intended to

become a regular practice of recognizing our worthy members. The award will be represented in the form of a plaque.

B.K.Patel, Chair - Awards Subcommittee

AWARDSS03.doc

7.0 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 removal of material (attendance lists and some general items, typically items from the Administrative Subcommittee Meeting, covered elsewhere) not required in these assembled Minutes. Complete (unedited) Subcommittee meeting minutes are individually posted on the Committee website (<http://www.transformerscommittee.org/>).

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

The Insulation Life Subcommittee met at 8:00 AM Wednesday, March 19, 2003 in Raleigh NC. Attendance was 29 members and 78 guests.

The minutes of the October 23, 2002 meeting in Oklahoma City were approved.

7.1.1 Chair's Report

ADCOM meeting on Sunday. Details of the discussions will be reviewed in the Main Committee meeting.

The metrification policy is still being discussed. As of now, there are no changes in our directions or plans.

Linden Pierce, the former chair of this subcommittee has requested Emeritus membership status, and it has been approved.

Our next subcommittee meeting will be in Pittsburgh PA on October 8, 2003.

7.1.2 Status Reports for active projects:

7.1.2.1 C57.91 Loading Guide

The loading guide, C57.91, has been balloted for reaffirmation, along with a corrigendum covering several errors that had been found in the printed document. The ballot included an electronic version of the guide and it contains several errors produced during the scanning process. It had to be revised to clean up those errors.

The Standards Board would not approve the guide because the contents of the corrigenda had not been included in the balloted document. There were also some negatives and Linden is working to get the document ready for recirculation.

7.1.2.2 Corrigenda ballot C57.91 Loading Guide

This document has been approved.

7.1.2.3 Reaffirmation of IEEE 1276

Mike Franchek has balloted the reaffirmation of IEEE 1276, Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers.

The ballot closed Oct. 5, 2002 and was successful with an 87% return and a 99% approval. Mike will be working to resolve the one negative, and prepare the document for the standards board.

7.1.2.4 Definition of Thermally Upgraded Insulation

Several members of the subcommittee and many guests met on Tuesday, to review efforts to find a definition of thermally upgraded insulation. Attendance was 58.

The Insulation Life Subcommittee received a request at our meeting in October 2002, to provide the definition to Phil Hopkinson. IEC representatives had asked him to provide it for consideration in their loading guide applications.

Although we are certain that these items were thoroughly debated and reviewed 40 years ago when thermally upgraded insulation was first introduced to the standards, none of us have found documentation. It would have most likely been internal documents produced by Westinghouse, GE and the other manufacturers, not in publicly available papers.

Tom Lundquist reported that ASTM test D982 tests paper to determine the nitrogen content. The conclusion to be drawn from the test is that if the nitrogen is between 1.3% and 4%, the paper is thermally upgraded insulation.

Tom Prevost questioned if a test that determined nitrogen content is adequate to define thermally upgrading. And suggested that a definition should somehow be tied to the rate of aging.

Harold More and Tom both stated that there are/were several different methods for upgrading paper. The methods used different chemicals and different means of introducing it into the paper. A complete description must include both the chemical and the processing techniques. They also agreed that an aging criteria must be applied.

Hasse Nordman explained some of the history of the request from IEC. The latest draft of the IEC loading guide included a side by side comparison, item for item of the IEC calculation method vs. the US IEEE method – where operation at 98°C produces a relative aging factor of one vs. the 110°C operation. An explanation that the material had to achieve a given aging duration at 110°C was considered inadequate and the document revision was rejected based on that. Therefore, a purely functional description based on aging criteria alone is not sufficient for the IEEE response to IEC.

Patrick McShane explained that Cooper has done a great many tests using a procedure they got for LADWP, and which is now described as the test procedure in C57.100 Annex A. These sealed tube aging tests compared nearly perfectly with the tests reported in an IEEE paper by Bill McNutt. He will collect some of that data to share with the group.

Various persons discussed testing to determine loss of tensile strength, DP, furan analysis and their correlation to the N₂ content. Jim McIver requested that if we agree to use nitrogen content as the evaluation that we verify its correlation to aging tests.

Harold Moore has agreed to look for old Westinghouse information and John Crouse will look for old GE data.

Tom Prevost suggested that a nitrogen test may be acceptable as the quality control test done by an insulation manufacturer and that type tests could be done to verify aging performance and conformance to the requirements of the standards. He also offered to get tests done to help verify the correlation of nitrogen content to long term aging properties.

A task force was formed to pull together this information and prior work. Don Platts will chair it.

7.1.2.4.1 Additional Discussion

Discussion within the Subcommittee followed the report.

Marlow stated that the IEC 98°C temperature for the basis of thermal loading is based on operating in a 20°C average ambient, versus the ANSI 110°C life operating in a 30°C average ambient. So they are not that different.

McShane asked how IEC verifies thermal quality?

Fyvie offered to get a definition of IEC thermal criteria.

7.1.3 Working Group reports were as follows:

7.1.3.1 Working Group on Loading of Liquid Immersed Transformer – Tim Raymond, Chair.

The Working Group met at 8:00am on Monday, 17 March 2003. The attendance results have not yet been compiled.

Don Platts informed the group the Linden Pierce was no longer able to serve as the WG chair. Tim Raymond was introduced as the new WG Chair. In addition to the appointment of a new WG chair, Glenn Swift was appointed Vice Chair and Sue McNelly was appointed Secretary/Technical Editor.

Current Status

The 1995 Corrigenda is complete and awaiting editor approval. The Corrigenda corrects some minor errors. A reaffirmation ballot will be conducted soon. We have 2 years to revise or reaffirm.

There have been two revision drafts by Linden Pierce. The latest draft (Draft 2) was sent out approximately 1 year ago. No changes have been made since.

Changes as of Draft 2 are as follows:

- Scope expanded to include voltage regulators
- Scope expanded to include silicone and high fire point liquids
- Gas evolution material replaced with model by T. V. Oommen
- Thermal models changed
- LOL limits added for power transformers
- Temperature. limits on bushings added
- Limits for 55C transformers added
- Many annexes moved to main doc.
- Effects of Over-, Under-excitation and non-sinusoidal load currents
- Clarified LOL section

New Business

Is there a need to revise? In previous comments, Don Platts gave three reasons he could think of for a revision:

1. Users are having problems with failures resulting from the use of the guide.
2. The guide is not applicable to their applications.
3. There is improved technological information available that should be provided to users.

Tim Raymond indicated that he thought a revision was appropriate based upon the amount of good work that has already been accomplished. There were no disagreements.

The scope, as it read in Draft 2, was then reviewed to ensure that the WG agreed with the expanded scope. Two issues were raised concerning the revised scope:

1. Are we de-emphasizing the 65C winding rise for the 110C hot spot?

Discussion:

- Don Platts indicated that he didn't feel that there was a big difference with either set of wording as they both would refer to C57.12.00.
- Tim indicated that he felt that using 65C would lead to less confusion. A comment was made that voltage regulators that are rated 55C have 110C rated insulation.
- The scope is a bit misleading with the "at rated load" in the description. Should either remove the "at rated load" or add "at 30C ambient.
- Due to the "30C average, 40C maximum ambient" wording in C57.12.00, we may want to add 120C maximum in parenthesis if we leave the scope as 110C.

2. Tom Prevost indicated that the WG may not want to expand scope to all fluids as it would greatly expand the amount of work and revision that will be required.

Discussion:

- Transformer manufacturers are coming up with new vegetable oils faster than the standards can keep up with them.
- Tim asked is there was a concern in applying this standard for transformers using vegetable oil. There was no answer.
- If we try to make the model work for all types of oil, it will be very complex. Should write a separate model for vegetable oils and one for mineral oils.
- Vegetable oils should be included, but should have a different loss of life than mineral oils.
- Tim asked for someone to elaborate on what other differences between mineral oil and vegetable oil. Main differences identified were: Viscosity, Coefficient of expansion, specific heat, thermal conductivity and one other that was not identified. Tim asked what the difference would be in temperature between the mineral oils and vegetable oils. Comment was made that it would be minor.
- Jin Sim indicated that he agreed that we would make the revision a huge task if we include the vegetable oils at this time due to heat transfer concerns that would also need to be addressed.
- Paper ages slower in vegetable oils, therefore, vegetable oil will become more dominant and have a positive effect on transformer loss of life.
- Tim indicated that his inclination at this time would be to not include vegetable oils and leave that to a later revision.

Following the discussion during the meeting and discussion with individuals after the meeting, it was decided that the Scope will read:

“This guide provides recommendations for loading mineral-oil-immersed 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 number of 55C rise transformers are still in service, recommendations that are specific to this equipment are also included.”

Liquids other than mineral oil will not be covered in this revision of the guide. Should the need for loading guide coverage of other insulating liquids arise, the issue will be readdressed at that time. The last subject discussed was the issue of the thermal modeling. There was quite a bit of comment on this area at the previous meeting and in the interim. There appeared to be some concern over the data requirements for the new proposed models (Annex G of C57.91-1995). Reasonable minimum data requirements must be established. Difficulty in obtaining data must be balanced with increased accuracy. There have been difficulties in obtaining data from transformer manufacturers for distribution transformers.

Proposed min data:

- No-load loss,
- load loss
- top oil rise
- avg winding rise
- hot spot rise
- weight of core & coils
- tank
- oil volume
- bottom oil rise?

Comment – Take the old equations and improve on the definition of the old equations and if possible extend them to make them better. Do studies that compare the different models to see what the differences are. Tim showed a graph that he had put together that showed a rough comparison of the different methods.

Question – Is there anything in the guide that if the user requested the information, that the manufacturer could not supply? The answer is no, but the concern is for older existing transformers. It would be a concern to the manufacturer if requested at the time of bid, but could easily be provided at the time of order or with test reports.

In other discussion, it was commented that it doesn't do any good to have a loading guide if C57.104 indicates that CO is a gas that needs to be monitored and has values that conflict with the loading guide. Tim suggested that maybe there should be a section that discusses increased maintenance intervals following overloads. Discussion followed. Not too detailed but maybe add a note in the standard for users to indicate what they could expect to see for gassing.

Bipin Patel suggested that the work needs to be broken up into sections or smaller groups. Due to the large size of the WG, it will be difficult to get anything done with such a large group. The Chair agrees and anyone that wishes to volunteer is encouraged to do so. The chair will attempt to identify areas that would benefit from the focused effort of a designated Task Force. It is hoped that a great deal of work can be accomplished between meetings, using electronic resources where possible.

The meeting was adjourned at 9:15am.

Respectfully Submitted, Tim Raymond - Working Group Chairman

7.1.3.1.1 Additional Discussion

Discussion within the Subcommittee followed the report.

Corkran commented the carbon dioxide level increase over time and within 1 to 2 years begin to bump into the levels identified in C57.104 as being of concern. He recommended that labs perform 1 or 2 year aging tests to check the CO levels to verify the C57.104 criteria.

7.1.3.2 Working Group on Definition of Thermal Duplicate – Barry Beaster, Chair.

The working group met on Tuesday, March 18, 2003 with twelve members and 29 guests attending. The membership roster has been adjusted by removing those members who have retired or will no longer attend the meetings. Two guests have requested membership. Mr. Tim Raymond of Power Delivery Consultants and Raj Ahuja of Waukesha Electric Systems were accepted as members. Due to the issuance of the document for an IEEE ballot, the ramifications of member changes will be discussed with IEEE. The membership roster remains at twenty-three members. An agenda, a collection of the comments from the IEEE sponsored ballot that closed in December 2002, and a new draft of Annex A – an example of modified calculations were electronically mailed prior to the meeting. Some additional paper copies were available for guests.

Since the document was balloted last fall, no working group meeting was held at the last Transformer Committee meeting. The ballot has met both the 75% return requirement and the 75% affirmation requirement. However, of the 104 votes returned, 20 negative ballots with a significant number of specific issues were received. After a short review of the document scope and purpose, it was agreed to address many of the small technical issues by individual working group assignment and have this working group meeting focus on a couple of key ballot comments where group discussion would bring a spectrum of thoughts and help to focus on the manner to resolve these issues. The working group had time to discuss four of these issues.

- The first is a new requirement in the guide that requires the test report to contain the hottest spot winding temperature rise. Some discussion was raised whether a comparison between the hottest spot temperatures between the tested and proposed duplicate should be made similar to other thermal characteristics. Due to the possibility that two transformers, which may meet the all the other comparison tests, may have discrete differences, such as de-energized tap arrangements, it will be necessary to require independent hot spot factor considerations for each transformer. This will be developed in greater detail and presented to the working group for further input and comment.
- The second issue was the conflict with the requirement for the maximum thermal loss measurement in the guide versus the C57.12.00 requirement for loss measurement only at the tap extremes when no thermal test is specified. In some cases, the maximum loss position may not be as specified in C57.12.00. This comment will be reviewed with the C57.12.00 revision working group for a recommendation.
- The third issue was the tolerance given for the winding gradient in the table of thermal characteristics. The tolerance given in the table is not reasonable considering the range of average winding rise and average oil rises permitted. Although the document implies the comparison is to be made between the calculated value for the new transformer to the measured value for the tested transformer, it is not clearly stated and if true, the objection is valid. Since this document is only a guide, several redundant comparisons are included for 'comfort' for individual examiners. It must be determined which of these comparisons in evaluating whether a design should be compared to another should be made on a calculated to calculated basis and which could compare the calculated values of the new design to the tested

values of the first transformer. A modification to the table will be made and circulated among the members for comment.

- The fourth issue relates to the relevance of this document to the large distribution or small power market. The negative comments related that the market may not be demanding the detail required by the guide for these size transformers. A comment made during the discussion may hold the answer for this market. In the introduction of the guide the purpose for developing this definition is intended to address situations where a user has a specification statement, "Perform a thermal test in accordance with C57.12.00 unless the manufacturer has thermal test data from a thermal duplicate transformer." If this is not identified in customer specifications, perhaps alternative techniques are acceptable? This guide cannot change the requirement of C57.12.00, but perhaps the 'thermal duplicate' definition might have a special clause for situations aforementioned. A section can be added and the validity tested in the working group.

Time had expired, the meeting was adjourned.

Respectively submitted, Barry Beaster, Working Group Chairman

7.1.3.2.1 Additional Discussion

Discussion within the Subcommittee followed the report.

Vietch commented that too much time was being spent on the topic. Those tests should be done to verify thermal performance rather than trying to justify the basis of calculations.

Several members commented that while testing may be appropriate for large power transformers, it is impractical, and inappropriate for distribution transformers.

7.1.3.3 Working Group Revision of C57.100, Test Procedure for Thermal Evaluation – Roger Wicks, Chair

The Working Group met at 9:30 AM on March 17, 2003, with 22 requesting membership and 25 guests present. This was the inaugural meeting of this newly formed working group

After introductions, the Chairman presented the agenda for the meeting, and circulated the attendance rosters with emphasis on the need for working group members to participate in the work at hand.

Following this, the Chairman and Don Platts, Insulation Life Subcommittee Chair discussed the background on the document, which helps define the timetable for the working group activity. The document has a 1999 publication date, so action on this document is required by the end of 2004.

The Chairman briefly reviewed the scope of the document as outlined in the most recent PAR for the last revision of this document, as well as from the document itself. This initiated a round of discussion regarding what the scope of the document should be. Major items discussed included:

- Does the standard thermally evaluate the transformer or the insulation system?

- Does the standard, as written, successfully cover both power and distribution transformers?
- When should this document be applied, i.e. under what circumstances should an equipment manufacturer conduct a test per this standard?
- Can the testing be stand-alone (direct) vs. a specified value, or does it need to be comparative to either a standard system or previous testing by the manufacturer?

The working group upon completion of this discussion, voted on the first of these items, and agreed that we should change the title of our document in the PAR submittal to be more consistent with the document intent, i.e.:

IEEE Standard Test Procedure for Thermal Evaluation of Insulation Systems for Liquid-Immersed Distribution and Power Transformers.

After this vote, there was additional discussion generated by a vote related to the comparative vs. direct testing question. This again raised questions, including what would require a change, what criteria should be used for acceptability (especially in the case of a “new system” with no comparison to old data), and when would a single point vs. full Arrhenius plot be suitable.

The working group voted at the end of this discussion to modify the scope in the PAR submission to omit the word “direct” in the thermal evaluation. This change will be incorporated into a draft scope which the Chairman will circulate to the working group for comment, prior to submission to the Standards Board.

The working group next discussed main areas of work for the revision of the standard, and this included the following:

- Does there need to be a third method (beyond the two in the document), to make the document more usable by the power transformer manufacturers?
- Are there other factors, beyond those listed, such as liquid testing, other aging factors (such as moisture, oxygen), which either need to be specified in the test, or evaluated?
- There is an IEC document in Draft CD stage – 62332, which might have influence over this work. The working group chair will try and gain permission to circulate to members of the working group.

Finally, the group confirmed that we needed to revise this document, not just reaffirm it as there are too many open issues at this time. It was felt that if work were well underway by the end of 2004, that the Standards Board would allow an extension to allow the Working Group to finish the work.

Work Assignments: The Working Group Chair will send copies of the document to all working group members and guests. The Working Group Chair will send a draft PAR to all working group members and guests, and expect comments back from the working group members within a reasonable amount of time.

The Working Group Chair closed the meeting by requesting equipment manufacturers who would be willing to share evaluations they have made in the recent past which may apply to this document. A couple of manufacturers and one material supplier agreed to provide short summaries of historical work.

The meeting concluded at 10:45 AM.

Respectfully submitted: Roger Wicks, Chairman Robert Whearty, Secretary

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

The meeting convened at 1:50 PM following the luncheon. Five members and 18 guests were present. Three guests requested membership and one guest who requested membership at the last meeting, was accepted as a member.

It must be reiterated that the objective of the Task Force is to write a technical paper and present a panel session on the subject of winding temperature indicators. An obvious requirement for membership in the group must therefore be a substantial contribution towards the completion of that objective. To require less would diminish the efforts of those who have contributed to the effort.

The minutes of the previous meeting in Oklahoma City were presented, but were not approved due to an oversight on the part of the chairman. (Solicit approval from members who were present at the WTI meeting yesterday and are present at this IL subcommittee meeting today).

Old Business:

A discussion of the changes and additions to the technical paper was had. Four major revisions were made:

1. The paper was re-sequenced to place common terms, instrument and sensor categories at the beginning of the paper in order to introduce them for later reference.
2. The paragraphs in section 1.2.1 which describe optical probes was amplified.
3. The abstract was modified to explicitly declare that an exploration of the response of winding temperature indicators to cooling inadequacy and step load increase is an objective of the paper.
4. Section 1.3.6 was added to address the response issues.

The group was polled regarding the thought that the manufacturer's section may become irrelevant in view of the lack of response to requests for help in completing it. The group responded that they thought the manufacturer's experiences on the subject were critical. The chair agreed and another request for authors to contribute to the transformer manufacturer's section was made. Several persons expressed interest and those persons will be contacted in the weeks following the meeting.

New Business:

During the last meeting in OKC it was decided that data was needed which could substantiate the various WTI type's response time. The data could be used to help describe how a particular WTI type would respond to a cooling auxiliary failure. The person who had thought that he could provide the data was unable to do so, and other alternatives were discussed by some of the members. The members

agreed that the most desirable solution would be to run a survey on a transformer or transformers which contained optical fiber imbedded in the winding as well as a heated hotspot thermowell.

It was decided to see if any such transformers existed and if so, whether their owners would be willing to allow a survey to be conducted. We were able to find three Transformer's Committee members who knew of several such transformers and would solicit their owners for permission to run the surveys. Hopefully the permission can be obtained and the surveys can be completed in time for the presentation of the paper at the next meeting in Pittsburgh.

While on the discussion of the surveys, the usage of fiber in Europe versus the US broke out. It was stated that fiber was routinely installed in transformers intended for service in Europe. The fiber is brought out through the tank wall, but is not often equipped with a measurement instrument. The fiber is used in the factory for testing purposes and is used with a portable measurement instrument in the field, by the utility, for verification or diagnostic purposes.

It was suggested that this practice should be suggested in the paper as a cost effective alternative to a permanent measurement instrument installation.

It was then pointed out that the paper did not include a section which was dedicated to these types of recommendations and it was suggested that a discussion section could be added immediately before the conclusions section to address that omission.

The meeting was adjourned at 1:30 PM.

Respectfully Submitted, Phillip G. McClure, Chairman

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

The task force did not meet - time for discussion was allotted during the subcommittee meeting. The Survey of the SC produced about a 50% return. The results were generally positive suggesting that we continue with the effort.

Dennis urged others to provide additional responses as input. He will try to resolve the negatives received in 4 weeks, and get a draft of the final proposal out in 8 weeks. Platts asked guests to contact him if they wanted to participate in the survey.

7.1.3.6 Task Force for Revision of Temperature Test Code in C57.12.90 – George Henry

Due to our sudden loss of George Henry, the task force did not meet formally. Don Platts did lead a short discussion to review the work ahead of the group- particularly the need to standardize the cooling curve extrapolation method. He also asked others to help to identify any open items that may have been considered by the previous task force that George chaired, but was deferred to a future time.

After the meeting Paulette Payne responded to the call for a volunteer, and she will chair this task force. Allen Mitchell has agreed to serve as vice-chair.

7.1.4 Old Business

There was no Old Business

7.1.5 New Business

The chair explained that Subhash Tuli had reported at our last meeting that ballots of C57.12.00 and C57.12.90 have been completed. They were successful, but there are several items to be resolved from the negatives and the comments. More than 40 of them were forwarded to our subcommittee for notification or for resolution. They have not yet been reviewed to determine the extent of our work requirements.

The meeting adjourned at 9:15 AM.

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

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

7.2.1 Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 11:00 A.M. on Wednesday, 3/19/03, with 76 members and 53 guests in attendance. 16 of those guests requested membership in PCS.

7.2.2 Approval of Meeting Minutes

The minutes of the October 23, 2002, PCS Meeting in Oklahoma City, Oklahoma were approved as written.

7.2.3 Chairman's Remarks

7.2.3.1 Administrative Subcommittee Notes

1) Next meeting dates and locations are as follows:

Fall 2003: October 5 –9, Pittsburgh, PA,
Spring 2004: March 7 – 11, San Diego, Ca,
Fall 2004 is Oct 17 – 21 in Edinburg, Scotland.

2) The Administrative committee is encouraging WG and TF Chairmen to make use of the Fast Track Electronic tool available to IEEE Standards members in the development of their Standards documents.

- 3) This year's IEEE PES meeting will be held in Toronto, Canada, during the period from July 13–18. The next meeting will be held in Denver, Colorado, from June 6–12, 2004. The next T&D Conference/Exhibition will be held in Dallas in September 2003.
- 4) In some cases, when an older Standard in a paper-form was sent to IEEE for reaffirmation, IEEE scanning of the document resulted in significant errors as the scanner did not identify tables and equations properly. WG chairmen will need to watch out for such errors. In the meantime, IEEE claims that their scanning equipment has improved significantly. Less number of errors should result. Also, electronically submitted documents can have similar errors due to differences in e-mail systems. A solution to this is sending the document in a PDF form.
- 5) If a member of a TF, WG, or SC is asked to provide input to a document, it is requested that if this member could not provide the input in time that at least he, or she, should respond indicating when the input will be ready.
- 6) Decision was made to use vice-chairs rather than co-chairs if there is a need for one.
- 7) Special awards are being considered for special contributions by members of TF, WG, SC towards new / revised Standards.
- 8) Minutes of this meeting should be sent to Don Fallon before May 9, 2003.

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>

7.2.3.2 Membership

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

Robert Veitch, Consultant	Bertran Poulin, ABB Varennes
Israel Barrientos	Tom Lundquist, SRP
Richard Graham, Hipotronics	Jim McBride, JMX Services
Vladimir Khalin, Kuhlman	Mark Cheatham, Duke Energy
Michael Mitelman, Consultant	Sanjay Patel, Smit Transformers
Paul Pillitteri, Trans Consulting	S. V. Kulkarri
Min Jea Lee, HICO	Marnie Roussell, Entergy
Wayne Hansen, Parsons Bringkerhoff	Dana Basel, ABB Jeff City

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.

7.2.4 Agenda Changes

None

7.2.5 Working Group and Task Force Reports

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

The PCS WG for Continuous Revision to C57.12.90 met in Raleigh, North Carolina on March 17, 2003 at 9:30 AM. There were 31 members and 34 guests in attendance. The following 20 guests requested membership, and are welcomed into the Working Group, bringing the total membership to 113:

Yunxiang Chen, Impulse NC, Inc.

Albert Walls, Federal Pacific

Devki Sharma, Consultant

William Boettger, Consultant

Pat Dooley, Transformer Specialist

Dirk Russwurm, HV Technologies

Mark Rivers, Doble Engineering

Charles Sweetser, Doble Engineering

Richard von Gemmingen, ABB Inc.

Marcel Fortin, Consultant

Anthony Washington, Southern Co.

Robyn Taylor, Teshmont Consultants

Carlo Arpino, ComEd

Virendra Jhonsa, Conectiv

Dilip Purohit, Consultant

Harry Friduan, ELCO Industries Ltd.

Alvin Kupp, ABB, Inc.

Alan D. Peterson, Utility Svc Corp.

Hossein Rezai, Delta Star

Triumphant Ngnegueu, VA Tech-JST

After introductions, the minutes from the October 21, 2002 meeting in Oklahoma City were reviewed and accepted as written. The Agenda was then reviewed and no changes were requested.

Subhash Tuli reported on the current status of C57.12.90. Mr. Tuli announced that the most recent ballot of C57.12.90 has resulted in some negative ballots that must be addressed by this WG. The negative ballots have been forwarded to the PCS Chairman, who in turn has forwarded them to this WG Chairman.

The Chairman reported on the status of working group items. There are currently 6 open items and each of these items is on the agenda for the current meeting.

Old Business

WG Item 11, "Single-Phase Excitation Tests" was discussed at length. The current draft, which incorporates the changes recommended at the previous meeting, was reviewed. The following changes were recommended:

1. Add a note regarding the effect of frequency (50 or 60 Hz) on the single-phase excitation test results. Ramsis Girgis noted that studies have demonstrated the frequency does not influence the results significantly and other IEEE documents are under development that will provide more

information on this subject. For the purpose of this document, a general note will be added stating that results of the single-phase excitation test will be essentially the same when performed at either 50 or 60 Hz.

2. Column 1, which refers to "Position" will be removed from each of the tables and a statement added under "Test Set-up" stating that the test shall be performed in the nominal tap position.
3. There was a long discussion regarding the proposed test voltage of 10 kV. Questions were raised regarding lower voltage windings that may not be suitable for 10 kV. It was recommended with general agreement that the test voltage requirement be reworded using the general format contained in Clause 10.10.3, which refers to power factor testing, with the appropriate modifications to reference the applied potential test levels. Subhash Tuli and Mark Rivers volunteered to offer the appropriate wording.
4. It was recommended that a basic schematic be provided to help clarify the test set-up. The Chairman will include a schematic in the next draft.
5. There were several concerns raised regarding the use of abbreviations and terminology that may be equipment specific. Mark Rivers, Charles Sweetser, and Steven Beckman agree to develop a generic description of the test and tables that can be used for data collection that are not equipment specific.

The Chairman will circulate a revised document for review by the WG once items 1 through 5 are completed.

The next item on the agenda was a discussion of WG Item 13, which is a proposal to revise Clause 9.5, the Zero-Phase-Sequence Impedance Test. Since time was beginning to run out, the Chairman handed out copies of the documents provided by the sponsor of the request and asked the WG members to take the documents and review them and be prepared to respond to a request for comments via email in the next several weeks.

During the final minutes of the meeting, a discussion was held regarding WG Item 15, which is a request for the addition of a statement in Clause 9.3.3.2 to clarify that Equations 4, 5, and 6, which develop the impedance values for the equivalent T-diagram for 3-winding transformers, only apply to concentric windings. It was the consensus of the WG that the statement is not required and that the equations are valid, even for non-concentric windings, if the data used is based on actual measured impedances. It was noted that equations might yield erroneous results if the data used is based on calculations rather than tests, since it can be difficult to accurately calculate the impedances between non-concentric windings. The Chairman will inform the sponsor of the WG's decision.

The justification submitted for WG Item 15 included a recommendation to add the statement "Correct the load losses of each winding to the MVA of that particular winding and then add to obtain total load losses to obtain three winding transformer losses." There was some discussion regarding the correct way to deal with load losses on 3-winding transformers. Alexander Kline noted C57.18.10 has wording that applies to this case. Ramsis Girgis volunteered to respond to the sponsor regarding this issue.

Since time ran out the remaining items on the agenda were tabled for the next meeting.

Follow-up

During the Performance Characteristics Subcommittee meeting at the Fall 2002 meeting, a discussion took place regarding WG Item 14, which was a proposal to develop wording for a test procedure for dissolved gas-in-oil analysis. It was concluded at that time that this item does not belong to PCS and should be referred to the Insulating Fluids Subcommittee. However, during the meeting of the PCS WG for Continuous Revisions to C57.12.00 on March 17, 2003, there was a consensus that the WG for Continuous Revisions to C57.12.90 *should* develop the test procedure with input from the WG for C57.12.00 and the Insulating Fluids Subcommittee. Based on this, the Chairman will re-open WG Item 14 and make the necessary contacts with the chairman of the PCS WG for C57.12.00 and the chairman of the Insulating Fluids Subcommittee.

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

The Working Group met on Monday, March 17 at 1:45 PM. There were 26 members and 43 guests in attendance. The following 4 guests requested membership, and are welcomed into the Working Group, bringing the total membership to 63 members :

Tom Harbaugh	Pennsylvania Transformer
Ron Daubert	Finley Engineering Company Inc.
Bruce Forsyth	Southwest Electric Company
Donald Cash	ADAPT

Following introductions, the minutes from the October 21,2002 Oklahoma City meeting were approved as submitted.

Subhash Tuli reported that all but 5 of the negative ballots have been resolved from the C57.12.00 ballot, which closed on August 2, 2002. After resolution of these outstanding negatives, the draft will be re-circulated before the next meeting in October.

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

WG item 40, a request to add acceptance criteria and descriptions for the various tests that were added into Table 19 of C57.12.00, 2000 revision. All but g) dissolved gasses in oil analysis, were addressed in previous meetings and documented in meeting minutes.

(g) Dissolved Gasses in Oil Analysis

“Note 14 : This test shall be a routine test for Class II power transformers and an other test for less than Class II transformers.”

There are several interrelated documents under development now that address this issue. A separate report, consisting of a review of the standards and guides that pertain to DGA testing, was prepared by Steve Antosz and discussed at great length in this meeting. The working group agreed with the conclusions of the report and recommends the following:

A new note 18 will be added to table 19.

“18—As a minimum, dissolved gasses in oil analysis shall be performed before the start of all tests (after oil filling), and after the completion of all tests.”

Limits and procedures for dissolved gasses in oil analysis will be referred to the insulating fluids subcommittee and the PCS C57.12.90 working group, respectively.

WG Item 42, a request to add oil volume as a requirement for type “A” nameplates.

In Table 10 under the column for Nameplate “A”, add the statement:

Oil Volume

At the autumn 2002 meeting in Oklahoma City, the Working Group discussed this request. Since distribution transformer users and manufacturers were not well represented in this meeting, it was decided to defer to the Distribution Transformers Subcommittee for their input.

The chairman of the Distribution Transformers Subcommittee has since responded, and reports that the present practice of all distribution transformer manufacturers is to include the oil volume on type “A” nameplates. Accordingly, this WG recommends that we incorporate this change in the next ballot of C57.12.00, as described above.

WG Item 45, identifies an editorial error with a heading in Table 5 of C57.12.00,

Dielectric insulation levels for distribution transformers and Class I power transformers

Columns 4, 5, and 6 are all listed under the heading “Front-of-wave impulse levels”. Column 6 lists low frequency test levels. It is recommended that this heading for “Front of Wave” be moved to include only columns 4 and 5.

The working group agreed : (1) that this was an editorial change, and (2) to changing the headings on the table as suggested. This change will be incorporated in the re-circulation of C57.12.00.

WG Item 46, a request to add column numbers to Table 7 of C57.12.00,

Minimum phase-to-phase insulation test levels for three-phase distribution transformers and for three-phase Class I power transformers

There are no column numbers used in this table, yet clause 5.10.4.2 refers to “...Column 2 of Table 7 ...”. It is recommended that column numbers be added to Table 7.

The working group agreed : (1) that this was an editorial change, and (2) to add the column numbers to the table as suggested. This change will be incorporated in the re-circulation of C57.12.00.

WG Item 47, a request to change the title of Table 8 of C57.12.00,
Minimum low frequency insulation test levels at neutral for Class I power transformers

Previous editions of C57.12.00 titled this table as “Minimum Insulation Levels at Neutral”. The title listed in the latest edition excludes distribution transformers. It is recommended that the title be changed to “Minimum low-frequency test levels at neutral for distribution transformers and Class I power transformers”.

The Working group agreed : (1) that this was an editorial change, and (2) that the title of this table should be changed to correctly reflect it’s content and purpose. The new title is

Table 8 – Minimum low-frequency insulation test levels at neutral for distribution transformers and Class I power transformers

This change will be incorporated in the re-circulation of C57.12.00.

WG Item 48, Comment received from drafts 3 and 4 ballots of C57.12.00 – 2000 requested that “Unless otherwise specified by the user,” be added to the first sentence of section 7.1.1 and 7.1.4.3 of C57.12.00.

The working group did not believe this change will improve the standard, therefore no change is required.

WG Item 49, C57.12.00 Section 7.1.5.2 Asymmetrical current used for Short Circuit Calculations. Comments received from drafts 3 and 4 ballots of C57.12.00 – 2000 stated that the x/r ratio for the user’s system is greatly different from the recommendations in this standard, and also differ from that used in IEEE C37.04 and IEC 56. They also do not reflect the x/r values used for radial feed systems as discussed in the IEC TC 17A and in CIGRE.

The Working Group accepted the offer of Ramsis Girgis to investigate this subject in the relevant ANSI/IEEE and IEC standards. The report will be available in 4 weeks.

WG Item 50, C57.12.00 Section 7.1.5.3 System characteristics. Comments received from drafts 3 and 4 ballots of C57.12.00 – 2000 stated that the default value of $X0/X1 = 2.0$ is too low (high?). The commenter stated that values of $X0/X1 = 0.6$ for 345 kV and above, and $X0/X1=0.4$ for 138 kV and below, are found to be typical on user’s system.

The Working Group accepted the offer of Steve Snyder to investigate the background for the commenter’s remarks, and report back to the WG at the next WG meeting.

WG Item 51, C57.12.00 Section 7.1.5.4 Present Limitations. Comments received from drafts 3 and 4 ballots of C57.12.00 – 2000 stated that the values given for the fault capacity are too high and may result in transformers being over-designed.

The Working Group discussed this and agreed that the standard should not be changed.

WG Item 52, C57.12.00 Section 9.2 Tolerances for Impedance. Comments received from drafts 3 and 4 ballots of C57.12.00 – 2000 stated that the tolerance for impedance is somewhat confusing and should be corrected. Suggestion was made to halve the tolerance for the rated tap position (i.e., $\pm 3.75\%$ for two winding transformers with impedance greater than 2.5%, $\pm 5\%$ for two winding transformers with impedance less than 2.5%, and $\pm 5\%$ for three winding / auto transformers). Also, the commenter stated that a $\pm 2.5\%$ per tap position tolerance be added for between taps.

The Working Group discussed this at some length. It was apparent that this issue will require a detailed discussion in the future. The chairman agreed to survey the PCS subcommittee and transformer manufacturers for their comments concerning this proposal, with emphasis on the practicality of manufacturing transformers today with a reduced tolerance on impedance. The results of this survey will be reported back to the WG at the next meeting .

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 3:10 PM.

7.2.5.3 TF on DETC Functional Life Testing – Phil Hopkinson, Chairman; John Gauthier, Secretary

The De-energized Tap Changer Functional Life Test Task Force met at 9:30 a.m. on Tuesday, March 18 in Raleigh, NC. There were 24 members and 20 guests present.

The scope of this task force has been changed from developing an entire specification for de-energized tap changers to developing a functional life test to demonstrate stability over the expected 30 year transformer life.

The chairman presented a proposed test that passes 2x rated current for 8 hours in a 130°C bath with 16 hours off for a total of 30 days. The test is passed successfully if the resistance does not change by more than 25% and stability has been reached. A report has also been proposed and distributed by the chairman.

Reinhausen, Cooper Power, and ABB have volunteered to perform the test and report on the results of their evaluation at the October meeting. Sheldon Kennedy has also volunteered to co-author the report.

The meeting adjourned at 10:45 a.m.

Subsequent to the TF meeting, the chairman of the PCS asked in the SC meeting whether members agree with the present roadmap of the Guide to include only this proposed life test, provided it is confirmed and accepted by other manufacturers based on their verification tests.

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

The Working Group on Switching Transients Induced by Transformer/Breaker Interaction was called to order at 8:00 AM on March 18, 2003. There were 94 attendees, 37 members, 7 requesting membership, and 50 guests. The agenda for the meeting was reviewed, and the Minutes from the October 22, 2002, meeting in Oklahoma City, Oklahoma were approved.

- 1) Draft 1.4 of the guide was briefly reviewed, and an effort will be made to get it on the IEEE Transformer's Committee website. Additions to this draft included an example, breaker information, and illustrations.
- 2) A discussion of the impact of the capacitance on the load side of the breaker; capacitance of the transformer versus frequency; and excitation of the system by either reignition (and its repetitive rate) or chopping was revisited. Analysis of circuit behavior must consider all of these factors.
- 3) A two winding transformer example was added to the guide to illustrate impedance and gain versus frequency and the distribution of voltages across the winding when the resonant frequencies are applied. Review of the example generated a discussion of the importance of the damping of the circuit at resonant frequencies. The presence of a resonant frequency and source will not always result in problem situation. Additional text will be added to the guide to clarify this area.
- 4) The working group concluded that the snubber portion of the guide should be descriptive only, and not provide design information.
- 5) Another example is needed, and it appears that the working group will be able to utilize an example from the tutorial that will be presented at this meeting.
- 6) In the next month several volunteers from the Switchgear Committee will provide additional input for the breaker characteristic clause of the guide. After incorporation of this material, 4 volunteers from this working group (Bipin Patel, Gustav Preininger, Arthur Molden and Bill Griesacker) will provide an overall review of the guide. All comments will be included in a new draft, which will be circulated as an informal ballot of the Performance Characteristics Sub-committee. Results will be discussed at the next meeting, after which the guide will then be sent out for a formal ballot.
- 7) There was no old business. Under new business the question of a user's understanding of interaction problems was raised. Consensus of the group was that fairly detailed modeling of system and transformer characteristics was needed.

7.2.5.5 Loss Tolerance and Measurement - Ed teNyenhuis, Chairman; Andy Steineman, Secretary

- 17 members and 19 guests attended, with 8 guests requesting membership.
- Minutes from the Oklahoma City meeting, Oct 22, 2002, were read and approved.
- Eddy So reported on the TF meeting for “Guide of Low Power Factor Power Measurements”
- There were 34 attendees at the meeting
- The Guide is now being edited by the National Research Council (NRC) of Canada as an NRC guide. This should be complete by the next meeting and Eddy So will make the guide available on a website to the TF and WG at that time. He will also obtain an up to date PAR from the PSIM for the next meeting. The process to preparing the guide for ballot will then commence.
- A new project was presented which will evaluate the accuracy error in the wattmeter of Figure 17 in C57.123 (No load loss measurement for three-wattmeter method, energized winding delta-connected, grounded wye source)
- It was reported that the C57.123 Loss Measurement Guide was released by IEEE Standards in December of 2002 and members of the WG received copies
- Frequency Conversion Factors of Transformer Performance Parameters
 - Stray Loss Factor Investigation – The WG was presented FEM calculated stray loss conversion factors for units with no shielding, magnetic tank wall shielding and two types of aluminum tank wall shielding. The values ranged from 1.19 to 1.28. It was found that the distance to the tank wall did not affect the conversion factor. The WG agreed that a single conversion factor of 1.23 would suffice since the error would be a maximum of 0.5% of the total load loss.
 - New wording in C57.12.00 - The WG was presented proposed wording to be added to Note 4 of Table 19. The WG agreed to the wording with the addition of “While it is most preferred to do the measurement at the rated frequency...”.
 - New wording in C57.12.90 Section 8.6 – The WG agreed to proposed wording with the following corrections:
 - “are recommended to” to be “shall”
 - “would” to be “shall”
 - 1.333 to be 1.33
 - Change the 2nd sentence to “Since the value of these conversion factors is an average value for all core materials, this would add 1% uncertainty to the accuracy of the measurement”

- New wording in C57.12.90 Section 9.4.3 – The WG agreed to proposed wording with the following corrections:
 - “are recommended to” to be “shall”
 - “would” to be “shall”
 - Change the 2^d last sentence to “Since the value of the conversion factors is an average value for the different types of tank wall shielding, this would add 1% uncertainty to the accuracy of the measurement.”
- New Wording in C57.12.90 Section 13.3.7 – The WG agreed to proposed wording with the following corrections:
 - “are recommended to” to be “shall”
 - “would” to be “shall”
 - Change the 2nd sentence to “Since the value of the conversion factor was developed as an average value of actual measurements, this would add 2dB uncertainty to the accuracy of the measurement.”
 - Add the sentence “Due to the greater uncertainty and the possibility of resonant frequencies, if the converted measured sound level with the 2dB uncertainty is not less than the guaranteed value, then verification of the sound level at site may be required.”

7.2.5.6 TF on Frequency Response Test Standard/Guide – Rowland James, Chairman; Charles Sweetser, Secretary

The PCS Task Force met for the development of a guide for Frequency Response Analysis (FRA) in Raleigh, North Carolina on March 18, 2003 at 3:15 P.M. There were **46** persons in attendance, **14** members and **32** guests.

Rowland James made a brief report on the development of the draft. He reported that Mark Perkins and May Wang provided general comments on the entire draft. Additional comments and contributions were provided by Larry Coffeen, Roger Hayes, and Ernst Hanique. Larry Coffeen was unable to attend due to illness in his family. Jim McBride of JMX Services, Inc., represented Larry.

The submitted comments were discussed with the task force. The comments and concerns centered around how the various methods, sweep, impulse, and enhanced, will be combined and included in the FRA Testing Guide. General wording was discussed to ensure consistency. A brief discussion regarding termination impedance, 50 Ohms or 10 Ohms, resulted in showing that 50 Ohms was more common and accepted as a standard for network analyzer measurements. Both impedances will still be considered.

Ernst Hanique proposed that the FRA application be expanded to determine various transformer characteristics for system modeling. After a short discussion, the task force expressed interest in only pursuing FRA for diagnostic purposes only.

Ramsis Girgis requested that a new outline structure be submitted to the FRA Task Force members. Members will be assigned for contribution according to their expertise. Charles Sweetser will generate the outline.

Bertrand Poulin expressed concern for adapting a versatile data format. That format has not been determined at this point.

After some general discussion of these reports the meeting was adjourned at 4:30 P.M.

7.2.5.7 Tutorial – Design Requirement in ANSI C57.12.00 that Determines Core Excitation. Presented by Dr. Gustav Preininger

Dr. Preininger gave a basic 15-minute tutorial on what parameters affect the magnitude of core excitation when transformers are designed per requirements of Std C57.12.00. The plan is to hold a full tutorial on Utility practices of overexciting GSU and network transformers and impact of these on transformer design. The tutorial is planned for the Pittsburgh meeting with contributions from Mr. Harold Moore as well as representatives from two manufacturers and two users of large power transformers. After the tutorial, TF members identified in the Oklahoma City meeting will decide on needed modifications to the loading section of C57.12.00.

More information on this presentation can be found on transformerscommittee website.

7.2.6 Project Reports

Time expired after Dr. Preininger's Tutorial presentation and the PCS meeting was adjourned at 12:15 P.M. Following are the Project Reports even though they were not presented at the meeting.

7.2.6.1 Status of C57.133 - Guide for Short Circuit Testing - Nigel McQuin, Chairman

The republication of this document continues to be denied by the IEEE editorial staff due to the quality of some of the figures. Particularly at issue is the suitability of the old traces used in the Guide. IEEE has insisted that more modern graphics be used, but this is not possible as this is just a republication of the existing document and the original traces seem to be not available. IEEE has been publishing this document for many years now and should have the originals, but claim not to.

Nigel will make a final push to get this issue resolved and will report on the outcome at the Fall meeting in Pittsburgh.

7.2.6.2 Status of Revision of C57.110-1998 - IEEE Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents – Rick Marek, Chairman

The document is nearing the end of the reaffirmation process, and looks to be in pretty good shape. The ballot closes at the end of March 2003, and will be 99% affirmative. One negative vote is due to conversion errors, and is editorial in nature. In fact there were several editorial comments, and all are related to the problem of converting the document from .doc format to .pdf format. These will likely be resolved relatively quickly and the document ready for publication.

7.2.6.3 Status of Reaffirmation Ballot of C57.21, 1990 (R1995) - Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500kVA – Peter Balma, Chairman; Richard Dudley report

An overview of the reaffirmation ballot process for C57.21 was provided during the WG meeting for Dry-Type reactors on March 17, 2003 and is reproduced here for the PCS minutes. Ballot results were as follows:

78	in eligible Ballot Group
53	Affirmative votes
5	Negative votes
<u>2</u>	<u>Abstention votes</u>
60	Votes = 76 % Returned
-	<u>3% Abstention</u>
<u>58</u>	<u>Votes = 91 % Affirmative</u>

Resolution of negative ballots has been ongoing with letters and email and phone calls have been made to those that submitted negative ballots. Four balloters have withdrawn negatives, and one balloter has confirmed their negative.

Remaining negative technical comments considered switching surge levels for dry versus oil filled reactors. In response to this comment the committee reviewed and agreed by consensus that the switching impulse level for dry type shunt reactors is set based on insulation co-ordination practice and should not be a function of construction. Dry type and oil immersed shunt reactors are to be used in power systems interchangeably. Therefore, this version of C57.21 satisfactorily addresses the issue and does not require a change. The second technical comment discussed the voltage at which sound level testing should be carried out. The negative comment suggested 105% of rated voltage. The committee discussed this comment and decided that the current wording of 10.6.3.4 allows for the sound level test to be carried out at voltage levels other than rated if so specified; thus a purchaser could specify 105%.

As a next step, as required by IEEE, the ballot will be recirculated to the ballot group with the remaining negative comments.

7.2.6.4 Tutorial – Switching Transients Induced by Transformer/Breaker Interaction – Presented Mar 18, 4:45 PM by Robert Degeneff, Philip Hopkinson, & Thomas Tobin

1. Abstract

Occasionally, when a transformer is switched into or out of a system, the transient voltage produced at the terminals of the transformer may contain a high frequency oscillatory component. This oscillatory voltage is the result of the system configuration and breaker characteristics. When this voltage has a frequency component near one of the natural frequencies of the transformer, and is of sufficient magnitude and duration, damage to the internal insulation structure of the transformer may result. This is a subject of interest of both the IEEE Transformers Committee and CIGRE.

This presentation explores the internal transient voltages that maybe produced as a result of the application of oscillatory voltages to the input terminal of a transformer. These transients are typically produced by the interaction of the transformer, breaker, load, and system. This presentation defines conditions that may produce voltages adverse to the transformer insulation system. It discusses the electrical characteristics of the system source, breaker, transformer, and load and the nature of their transient interaction. It suggests mitigation techniques. Several examples are provided.

2. Learning Objectives

This presentation will discuss the characteristics of the breaker, transformer and load, and their interaction. Specific topics discussed are:

- Characteristics of switching devices including closing phenomena addressing both ideal energization and repetitive reignitions. Opening phenomena will be discussed addressing both ideal interruption, current chopping, reignitions and repetitive reignitions. Device characteristics will be presented outlining the difference between switches and breakers and the differences between various interrupter mediums.
- Impedance characteristics of transformers will be explored and compared to normal impulse voltage characteristics. An example of a two winding transformer will be used to illustrate the definitions of resonance and internal amplification.
- The dynamic interaction of a system, breaker, and transformer will be explored. The effect of system topology will be examined. Mitigation methods will be suggested. Finally, several examples will be presented.

3. Learning Outcomes

The purpose of this presentation is to provide the participant a review of the characteristics of breakers and transformers and their unique interaction to aid in their recognition of conditions and applications where transformers are subjected to oscillatory switching transients that maybe damaging to their

internal insulation structure. Additionally, this presentation will discuss means to quantify their effect, and, if necessary, present methods of mitigation. Additionally, it will discuss the work presently underway by the IEEE and CIGRE.

More information on this presentation can be found on transformerscommittee website.

7.2.7 Old Business

None discussed

7.2.8 New Business

None discussed

7.2.9 Next Meeting

The next meeting is scheduled for October 8, 2003, in Pittsburgh, PA.

Submitted by: Steve Antosz, Secretary

7.3 Power Transformers – E. G. Hager, Chair, T. Lundquist, Vice-Chair

(Report at meeting presented by Joe Watson)

The Power Transformers Subcommittee met Wednesday afternoon at 1:00 pm with 45 members, 14 new members and 54 guests in attendance.

The minutes from the Oklahoma City meeting were approved before the various working groups and task forces reported.

7.3.1 WORKING GROUP AND TASK FORCE REPORTS

7.3.1.1 TASK FORCE FOR REVISION OF C57.17, ARC FURNACE TRANSFORMERS – Dom Corsi, Chairman

Robert Ganser reported that the Task Force on revision of C57.17, Arc Furnace Transformers, was called to order at 8:00 am on Monday, March 17, 2003. There were 19 attendees.

Dom Corsi then presented the Agenda. The first order of business was review and approval of the minutes from the October, 2002, meeting that was held in Oklahoma City.

Dom Corsi announced that it was his intention to submit a PAR for this activity by the end of April

2003. In addition, the draft template for the revision work will be available in Word format one week after the meeting.

The Work Scope statement of the Standard was presented for review. The TF recommended that the term "ferrous" be removed from the Scope. This would open the Standard to all arc furnace transformer applications for various service applications and duties. A method for describing these applications and service duty requirements will be addressed within the revised Standard.

The revisions to Section 4 (Impedance Voltage) and Section 7 (Construction) were accepted.

The topic of Insulation Levels led to a discussion of the common failure mechanisms of arc furnace transformers. Some members suggested that a section on transformer protective requirements be considered for inclusion in the revision. The group agreed in principle that protection techniques such as snubbers, capacitors and relaying schemes would be better placed in an Appendix and as a Guide.

In addition, the group recommended a review of C37 for any requirements specifically related to switchgear application to the primary of arc furnace transformers.

Under New Business, the Chair will be contacting individual TF members to participate in the writing of the revision. Each section and Appendix of the draft will be authored by one individual member of the group.

Mr. Tom Slovik provided additional recommendation, requirements and inclusions to the Standard that he, Mr. Ugo Piovan and Mr. Giovanni Testin discussed in February 2003. The comments were provided in written form to the Chair.

Being no further business to discuss, the meeting adjourned at 9:00 am.

7.3.1.2 TASK FORCE ON A GUIDE FOR STANDARD CONTROL CABINET DESIGNS – Joe Watson, Chairman

The task force met at 11:00 am on Monday, March 17, 2003, with 36 in attendance. There were 18 members and 18 guests.

The chairman checked with the group to ascertain whether all group members were receiving the group correspondence by e-mail. A couple of people were recorded as not receiving the email, and they will be contacted further to determine the source of the problem.

The next discussion concerned the results of the Control Cabinet Survey. Ten users and 6 manufacturers responded. The results will help us to understand what should be considered as a standard item. It was noted that manufacturers and users sometimes differed on what is rare and what is frequently required, such as vibration reduction mounting.

C37.21 was brought up again, and many sections of the latest draft were mentioned as to having applicability to the Guide for Standard Control Cabinet Designs. It was questioned as to whether we want to create a stand-alone standard, or use C37.21. It was decided that C37.21 does not contain all of the information that the group feels is needed, so it will be used as a resource to us.

The chairman mentioned that we need to be able to provide users with standard designs for units without forced-air ratings, units with forced-air ratings, and forced oil units. LTC and non-LTC versions of each will be provided. Brent Hayman volunteered to provide 8 ½ x 11 drawings of a non-LTC, non forced-air unit in PDF format to the chairman for distribution to the group as a starting point.

It was mentioned that C37.91 and C57.12.10 should be utilized for descriptions and functionality of components.

The standard control drawings, as well as the C37.21 standard, will be emailed to the group over the next few months.

The meeting adjourned at 11:50 am.

7.3.1.3 WORKING GROUP ON LOAD TAP CHANGER PERFORMANCE - William Henning, Chairman

The Working Group on Load Tap Changer Performance met on Monday, March 17, at 1:45 pm with 17 members and 33 guests attending. The minutes of the previous meeting of October 21, 2002 were approved as written.

The business of the WG was to discuss the need for a general revision of C57.131-1995, Standard Requirements for Load Tap Changers. There are three sources of proposals for revision.

- Comments received during the IEEE re-affirmation ballot of C57.131-1995.
- Input from the De-Energized Tap Changers (DETC) Specification and Test WG, which has now become the Task Force to develop a functional life test for DETC's.
- A review of IEC 60214-1, Tap Changers Part 1: Performance Requirements and Tests.

The WG discussed a new title, new scope, and new purpose for the document. These items were modified to include DETC's as well as load tap changers (LTC's).

The WG then discussed IEC tap changer standards. There are two relevant documents:

- IEC 60214-1, Tap Changers- Part 1: Performance Requirements and Tests
- IEC 60214-2, Tap Changers- Part 2: Application Guide

The first document is an approved IEC Standard that has been published. The second is completely written, but not yet approved.

These two IEC documents are parallel to two IEEE projects assigned to this WG. IEEE PC57.131, Standard Requirements for Tap Changers, covers the same material as IEC 60214-1 and IEEE PC57.141, Tap Changer Application Guide is a parallel document to IEC 60214-2.

The WG discussed the possibility of IEEE simply adopting the existing IEC Standards. This would be accomplished by conducting a formal ballot to adopt these IEC Standards as IEEE Standards. If approved, they would become IEEE Standards.

Some felt that this may not be possible because changes might be required to reflect US practices. The WG agreed, though, to attempt to simply adopt the new IEC Standards as a first step.

The meeting was adjourned at 2:45 pm. After the meeting, some discussions continued about the IEC documents. One suggestion was for IEEE to assign numbers of C57.131.1 and C57.131.2 and to title them Part 1 and Part 2 like the IEC Standards. Another suggestion was to schedule two timeslots at the next and subsequent meetings to develop both documents at the same time.

7.3.1.4 WORKING GROUP ON C57.140 “GUIDE FOR THE EVALUATION AND RECONDITIONING OF LIQUID IMMERSSED POWER TRANSFORMERS” - Rowland James, Chairman.

William Bartley reported that the Working Group on C57.140, the Guide for the Evaluation and Reconditioning of Liquid Immersed Power Transformers, met at 3:15 pm Tuesday, March 18th, with 100 in attendance. There were 60 members and 40 guests. 14 of the guests requested membership.

After introductions, a brief discussion of the latest draft's status was held. The chairman reported that an extension to the PAR has been requested. Tom Prevost will advise us on the status of the request.

The draft is essentially complete with the exception of six articles. Numerous volunteers were recruited to complete the document. We hope to obtain those sections within 60 days. The Guide will then be edited/reorganized into a more logical sequence. The next draft should be issued by early to mid-summer.

Discussion from the floor:

- There was a discussion on off-line and on-line dry out methods. Concern was voiced with the article on the on-line method. It will be revised to make it more general in nature with proper precautions.
- A discussion of Furan analysis vs. DP testing was also held. The consensus of the group was that Furan analysis can not be related to DP values.

The meeting was adjourned at 4:30 pm.

7.3.1.5 WEST COAST WORKING GROUP - Michael Lau, Chairman

Michael Lau reported that the West Coast Working Group met on Tuesday, March 18, 2003 at 8:00 am with 8 members and 2 guests present. One guest requested membership.

The chairman provided a summary on the last meeting and the intention of the group to write a supplementary guide to IEEE 690, Recommended Practice for Seismic Design of Substations. A discussion was held on the sudden pressure relay and the potential false tripping of such during seismic events. It was concluded that despite this outstanding issue with the sudden pressure relay there is inadequate justification for a supplemental guide.

The group then discussed other potential projects. This includes: step-up transformers for wind turbine and other distributed generation applications, operation of transformers in severe conditions such as extremely high or extremely low temperatures and problems associated with shipping of transformers.

At the end, no decision was made and the West Coast WG still has no active projects. The meeting adjourned at 9:19 am.

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

Mike Lau reported that the Working Group on the Installation of Liquid-filled Transformers was called to order at 9:35 am on Monday, March 17, 2003. There were 35 attendees; 18 members, 13 guests and 4 requesting membership. The agenda for the meeting was reviewed followed by approval of the minutes from the October meeting in Oklahoma City. The minutes, a new draft of the Guide, copies of the overheads presented and a table prepared by Paulette Payne on vacuum processing and filling were distributed.

Contributors to-date were recognized for their input.

A summary of key points from the last meeting included the need for a revised PAR to include maintenance in the Guide, and that the Guide' format will most likely change to merge the large and small transformer sections together to avoid duplication. It was suggested that Clause 4 for large transformers be completed first, and then could be used as a guide to blend into Clause 3 for small transformers.

The next draft of the Guide will be placed on the Transformer Committee's website, and will be accessible with the Transformer Committee's password. In addition, the next revision of the Guide will be e-mailed to participants approximately one week prior to the next meeting.

Procedurally, it was decided that each clause of the Guide would be reviewed once by the WG, and would not be revisited at future meetings. An informal subcommittee ballot will be held prior to a formal ballot of the Transformers Committee to provide an additional opportunity for input.

A review of Draft 2 was started. Clause 1 (Scope) and Clause 2 (References) were reviewed without comment. The review then moved to Clause 4 and the following items were recommended and discussed.

- A common clause to describe cautions and concerns for entry of personnel into transformers is needed. It should recognize local and national requirements and/or the absence of requirements and provide the sufficient information for this work to be performed safely. Joe Watson volunteered to prepare a draft.
- Clause 4.2.2.6, (impact recorders) will provide additional clarification on the capability of electronic recorders that are now available, and additional guidance that the impact recorder attached to the transformer should be left on the transformer until the transformer is rigged into its final location.
- The discussion of rough handling during shipment and receiving should be expanded to include the levels and durations of impacts that the manufacturer and user should be aware of. These are not design values but rather values for discussion. Suggested values were:

Type of Impact	Levels for Discussion
Longitudinal	3g
Vertical	2g
Transverse	2g

- The need for Clause 4.6 (Preliminary liquid filling) was discussed, and the group voted to eliminate the clause. Consensus was that the clause resulted from historical needs, and that the state of the art had advanced to where it is no longer required.
- Clause 4.7.1 (Assembly – General) will be modified to include a statement relative to grounding bushings as soon as they are installed, and also to avoid unnecessary atmospheric exposure of the core and coils.
- Clause 4.7.2 (Bushings) will be modified to discuss bushings that require the capacitance tap to be grounded or ungrounded, and the impact of adding a bushing monitoring system. In addition, additional clarification of the testing of C1 and C2 with and without a tap present will be discussed.

General guidelines for the review of a clause of the document were shared, and volunteers to review the clauses were as follows:

- Clause 3.1 & 4.2 (General & Shipping): Wes Kunth
- Clause 3.5 & 4.7 (Assembly): Wayne Hansen
- Clause 4.11 (Tests): Paulette Payne

A suggestion was made to add storage guidelines to Clause 4, for larger transformers.

Paulette Payne provided an update of Doble’s activities in the area and shared a comparison of key vacuum processing levels and times for consideration of the group. It was recommended that any tables related to processing should clearly delineate voltage classes of equipment to which they apply.

Under Old Business, a reminder was made to add a clause relative to cold weather dewpoint testing.

There was no other Old or New Business, and the meeting adjourned at 10:44 am.

7.3.1.7 WORKING GROUP ON ON-LINE MONITORING OF LIQUID IMMERSSED TRANSFORMERS - Donald Chu and Andre Lux, Co-Chairpersons

Donald Chu reported that the Working Group for the Guide for Application of Monitoring to Liquid-Immersed Transformers and Components met Tuesday, March 18th at 3:15 pm. There were 56 attendees; 20 members, 36 guests and 7 requesting membership.

After introductions, a brief discussion was held on the status of the Guide. Restructuring was done because there were many overlaps between clauses. Sections were also reorganized.

Since the revised Guide was distributed at this meeting, there were no discussions or comments on the Guide. Discussions were held on how to get the Guide “back on track” and expedite receipts of comments. A small group will meet at the IEEE Summer Meeting with a survey scheduled for this summer.

Since there were no other discussions, the Chairman asked if any utility would discuss the status and philosophy of monitoring. Con Edison of New York discussed how monitoring was being used to perform predictive maintenance, in lieu of scheduled maintenance.

The meeting adjourned at 4:00 pm.

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

Phil Hopkinson reported that the de-energized tap changer functional life test Task Force met at 9:30 am on Tuesday, March 18. The meeting was attended by 24 members and 20 guests.

The scope of this Task Force has been changed from a full specification for de-energized tap changers to a functional life test development that will demonstrate contact stability of de-energized tap changers.

The chairman proposed an accelerated test that applies 2 times rated current for 8 hours in a 130°C bath, followed by 16 hours off. The test is replicated for 30 days. Pass/fail criteria are resistance that does not change by more than 25% and stability at the end of the test.

Reinhausen, ABB and Cooper Industries volunteered to perform the test and to report progress at the October meeting. The chairman is also seeking other authors for the report.

The meeting adjourned at 10:45 am.

7.3.1.9 WORKING GROUP FOR REVISION OF C57.12.10 - Javier Arteaga, Chairman

David Aho reported that the Working Group met at 1:45 pm on March 18th with 17 members, 10 guests and 6 new members. The minutes from the Oklahoma City meeting were reviewed and approved.

For now, the document will proceed with dual dimensions as appropriate.

Since the scope of this document is solely for Power Transformers, all references to Distribution Basic Impulse Level (BIL) will be removed. This change will impact a number of accessory items currently identified in the document.

The wording, with respect to accessory applications, will need to be reviewed. For some accessories, their application is dependent on the type of transformer construction (i.e. sealed tank, conservator). A separate Table will be developed to define specific accessory requirements.

Since the scope of the PAR has no upper limit on either kVA or voltage, the document will need to be revised to handle ratings beyond the current version of C57.12.10. Also, each style of tank construction (i.e. sealed tank, inert gas pressure, conservator and gas-liquid seal) must be addressed.

All transformers will require a manual "pressure relief valve" along with a cover mounted pressure relief device (PRD). The rating of the PRD will need to be addressed.

Table 11, Basic Standard Construction Features, will need to be modified due to elimination of distribution BIL's and exceeding the 60 MVA rating.

The LTC section was briefly discussed. Jim Harlow had revised this section well over a year ago and it needs to be reviewed by the WG. This section will be reviewed in detail at the next meeting. The one item discussed had to do with the physical location of the tap switch position indicator drag hand reset provisions and whether the provisions are electrical or mechanical. The reset provisions must be at a reasonable height for someone to operate from ground level. A suggestion was made to limit the height to around 2 meters (80"-84").

A number of other miscellaneous issues and comments were addressed for gauges and valves.

The draft document will be circulated for additional comments. Volunteers will be needed to critique specific sections.

With no further business, the meeting adjourned at 3:00 pm.

7.3.2 OLD BUSINESS

Tom Lundquist reported that a new TF will be formed for revision of C57.135, the Phase Shifting Transformer Guide.

Red Hager initiated a discussion on the need for more volunteers and the responsibilities of WG and SC members.

7.3.3 NEW BUSINESS

Don Cash reported that C57.117, the Guide for Reporting Transformer Failure Data and C57.125, the Guide for Failure Investigation were both due to expire this year. Wally Bender has volunteered to see these 2 Guides through the reaffirmation process.

Tom Lundquist reported on tests to measure the natural frequency of transformers to determine capacitance values as a modeling tool for Transient Recovery Voltage calculations. Mr. Lundquist offered all users who would like to also have this information a section to add to their transformer specifications to perform these tests if they would e-mail him requesting the section..

The meeting adjourned at 2:15 pm.

Submitted by Joe Watson, Secretary

7.4 Underground Transformers & Network Protectors SC – C. G. Niemann, Chair

Meeting Minutes – Raleigh, North Carolina

7.4.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met on Wednesday, March 19, 2002, in Capital Room 20 of the Sheraton Capital Center Hotel at 9:30 AM with twelve members and three guests present.

7.4.2 Approval of Minutes

The minutes of the October 23,2002 meeting in Oklahoma City, Oklahoma were approved as submitted.

7.4.3 Membership

Membership stands at 20 members.

7.4.4 Chairman's Remarks

Administrative Subcommittee Notes Reported to SC

- Attendance at meeting is 306 registered and 40 companions.
- The subcommittee was informed that NEMA and IEEE had reached an agreement and that all NEMA copywrited C57 standards had been turned over to IEEE.
- Discussion on rebalot of C57.12.34.

- No word received yet from IEEE on the metrification issue. The Underground Subcommittee Chair voiced his displeasure with the delay as it was affecting how we will proceed in standards revisions.

7.4.5 Working Group Reports

7.4.5.1 Three-Phase Underground-Type Transformers (C57.12.24) J. Sullivan – Chairman

1. Met on Monday, March 17, 2003, at 9:30 AM in the Capital Room with nine members and six guests present.
2. Approval of minutes of last meeting were dispensed with as there was no meeting in Oklahoma City.
3. The Working Group decided to pursue a new PAR to cover revision of the document.
4. Several items for revision were brought up:
 - a. Fins – 12 Ga is specified. However no one any longer supplies that gauge.
 - b. Tank material, thickness, and coating requirements.
 - c. Address construction requirements for wet and dry applications in the standard.
5. A task force was named to review the standard and discuss needed revisions prior to the next meeting.. Members are: Giuseppe Termine, Brian Klaponski, Dan Mulkey, and John Sullivan.
6. Giuseppe Termine was named Vice Chairman of the Working Group.
7. Meeting was adjourned at 10:05 AM.

7.4.5.2 Liquid Filled Secondary Network Transformers (C57.12.40) B. Klaponski - Chairman

1. Met on Monday, March 17, 2003 at 3:15 PM with 13 members and five guests present.
2. Minutes of the October 21, 2002 meeting in Oklahoma City, Oklahoma were approved as submitted.
3. The WG discussed the metrification issue and the fact that the Administrative SC on Sunday had given direction to proceed with dual dimensioning. The Chairman insisted he would not proceed in that direction until the Standards Board approved this direction. This standard is being held up on the metrification issue.
4. The current ANSI/NEMA standard has numerous editorial errors and our current PAR was intended to be short lived to correct these errors and then publish this document as an IEEE

document. Caution should be exercised with the current C57.12.40 - 2000 NEMA document. A new PAR will not be submitted until this is resolved.

5. To make use of this meeting discussion continued as if we were working under a new PAR. A detailed proposal on the rating of the three position primary switch was discussed based on a letter from Larry Dix of Quality Switch. Based on the discussion Larry will revise his proposal wording to include:
 - a. A 1500 amp ground circuit requirement
 - b. A resistance change criteria for the switch
 - c. A specific torque change criteria

From this revised proposal existing switch manufacturers will verify the acceptance of these criteria .

6. The Part II of this standard that used to be included for Con-Ed was again discussed. It is noted that prior to application for a new PAR, Con-Ed will be requested to attend our meetings, state their case in regards to Part II, and participate in the standard development. No ConEd representation was at this meeting.
7. The meeting was adjourned at 4:30 PM.

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

1. Met on Monday, March 17, 2003 at 1:45 PM with five members and six guests present.
2. Minutes of the October 21, 2002 meeting in Oklahoma City, Oklahoma were approved as written.
3. The WG reviewed changes added since the last meeting.
4. Additional discussion centered on:
 - A. Need for Table 4. No resolution, will be worked on between meetings
 - B. 5.2.5, 5.2.5.1 – Need to conform 10kV BIL in this vs. 30kV BIL for network transformer secondary.
 - C. 11.4.1 – “cm” should be “mm”.
 - D. Section 11.4.1 Transformer Mounted. The “C” dimension as referenced in C57.12.44D1.3 in the 2500-4500A unit size does not agree with C57.12.40-2000 Figure 4. Mistake in .40 document.
5. Next meeting will be held in Pittsburg, PA on October 5-9, 2003.
 - A. One working group session required for the next meeting.
6. The meeting was adjourned at 3:00 PM.

7.4.5.4 Ventilated Dry-Type Network Transformers (C57.12.57) A.L. Robinson – Chairman

No report. Working Group did not meet

7.4.6 Old Business

- 1) Continued discussion on removal of metric units from standards. Subcommittee is in favor of dual unit system. The Underground Transformers and Network Protectors Subcommittee Working Groups are not in favor of moving forward on revisions until this issue has been resolved with the Standards Board.

7.4.7 New Business

None

7.4.8 Future Meetings

The location and dates for future meetings are as follows:

October 5-9, 2003	Pittsburgh, Pennsylvania
March 7-12, 2004	San Diego, California
October 17-21, 2004	Edinburgh, Scotland

The Subcommittee adjourned at 10:45 AM.

Submitted by Carl Niemann

7.5 Audible Sound and Vibration SC – Jeewan Puri, Chair

Audible Sound & Vibration S.C. met at 8:00 a.m. with 14 members and 7 guests present. Three new members were welcomed to our subcommittee.

The minutes of our October 23 meeting in Oklahoma City, Oklahoma were approved with one correction.

7.5.1 TASK FORCE REPORT - TF for writing “Sound Level Measurement Guide”

Jim Nielsen; the Chairman of the TF for writing “Sound Level Measurement Guide” could not attend this meeting for personal reasons. In his absence, John Holland conducted this meeting. Jeewan Puri acted as the secretary. This TF met on Tuesday March 18 at 3:15 p.m. with 11 members and 6 guests present. Four new members were welcomed to this Task Force.

The task force resolved thirty comments toward writing the first draft of IEEE Sound Level Measurement Guide for Liquid Filled and Dry Type Transformers and Reactors using IEC 60076-10-1 as a reference document.

The first draft of this guide will now be written and circulated among the members of the task force for their comments. These comments will be discussed in our next meeting.

7.5.2 New Business

The Subcommittee Chairman – Jeewan Puri introduced a new business item. He reported that Mr. Steven Snyder – WG Chairman for the Revision of C57.12.00 had requested this subcommittee to create a “Standard Sound Level Table” for liquid filled transformers for inclusion in this standard. The present information on this subject exist only in NEMA TR1 which an obsolete and does not cover the entire kVA range of transformers presently being produced in the industry.

The Subcommittee voted to create a Task Force to address the issue of Standard Sound levels for liquid filled and dry type transformers. Nine participants volunteered to participate in this Task Force. This group will be responsible for proposing the standard sound level tables and defining the range of transformer product lines to be covered by these tables.

Jeewan Puri presented a “Progression Analysis” methodology for reviewing and extending the present sound level tables in NEMA TR1 and ST 20 standards. It was suggested that this methodology should be evaluated by the Task Force for creating Standard sound level tables. Jeewan Puri will send this analysis to the Task Force and the Subcommittee members and invite their comments. These comments will be reviewed in our next Subcommittee meeting.

The meeting adjourned at 9:15 am.

Submitted by: Jeewan Puri

April 16, 2003

7.6 Bushings SC – Fred Elliott, Chair

(Report at meeting presented by Prit Singh)

7.6.1 Introduction/Attendance

Acting Chairman, Pripal Singh opened the meeting at 3:00 PM and welcomed the members and guests. There were 46 attendees with 17 members and 29 guests present.

7.6.2 Approval of Minutes of Last Meeting

The minutes were approved as written.

7.6.3 Chairman's Remarks

Since, Fred Elliott was unable to attend these meetings, Loren Wagenaar offered the following remarks after attending the Administrative Subcommittee meeting.

- Metric conversion issue was discussed. The first test case for metrification generated a lot of negative votes within the balloting group. It appears the users seem to prefer dual dimensions. The IEEE Standards Board is in the process of discussing this issue.
- Minutes of the Subcommittees due to Don Fallon and Susan McNelly on May 9, 2003
- Next Transformer Committee meeting will be held in Pittsburgh. October 5 – 9, 2003
- The Operation and Procedures manual will be revised. In addition to other changes, corresponding members will be recognized.

7.6.4 Working Group and Task Force Reports

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

A PAR extension has been requested in order to resolve one outstanding negative vote. If unresolved a recalculation ballot will be required.

7.6.4.2 TF Revision of C57.19.100 – Keith Ellis, Acting Chair for Tommy Spitzer

The acting TF Chair opened the first meeting at 11:00 AM and welcomed the guests. Introductions were made and an attendance list was circulated. There were 33 people in attendance with 25 requests for membership on the TF.

The agenda was reviewed and discussion began on the proposed revisions to the document. The following agenda items were discussed with the corresponding volunteers offering to provide suggested text for those items:

- Mounting angles greater than 20°. Volunteer; *Pritpal Singh*
- Applying “Outdoor” bushings indoors; Volunteer; *Devki Sharma*
- Temperature correction of Power Factor; *Mark Rivers*
- Harmonize with IEC. Volunteer; *Keith Ellis*
- Thermal loading above nameplate rating for bushings applied on power transformers. No action taken on this subject at this time. This item will be recirculated for clarification within the Bushing Subcommittee.
- Temperature calculation for short-time loads above bushing rating. Volunteer; *Chris Monoski*

- Test procedures for derivation of mathematical model. Volunteer: *Chris Monoski*
- Temperature rise tests for draw lead cables that are not supplied by the bushing manufacturer. Also include draw lead temperature considerations and effects of oil level in the bushing tube. Volunteer; *Pripal Singh*
- Thermal loading for bushing used with isolated-phase bus. No action at this time as there is guidance already in the document.
- Bushing maintenance practices:
 - Add a method to determine C1 power factor of RG bushings. Volunteer; *Chris Monoski*
 - C2 testing of bushings rated below 115 kV. Volunteer; *Mark Rivers*
 - The effects of the bushing power factor on transformer power factor measurements. Volunteer; *Mark Rivers*
 - Bushing storage considerations; Volunteers; *Carlo Arpino & Tommy Spitzer*

It was requested that volunteers submit their suggested text to TF Chair, Tommy Spitzer, tommy.spitzer@txu.com with a copy to Keith Ellis, Keithcota@aol.com at least 60 days before the Fall Transformers Committee meeting in Pittsburgh.

New Business

There was discussion on DGA of bushing oil. Mike Lau with BC Hydro indicated success in finding bad bushings by taking oil samples and running DGA. The acting Chair indicated that most bushing manufacturers do not recommend oil sampling from “healthy” bushings. If there is continued interest in this subject further discussion could be undertaken within the TF.

The meeting was adjourned at 12.15 PM.

7.6.4.3 Report of Technical Advisor to IEC SC36A

Pritpal Singh read a report from John Graham on the activities of TC 36, SC36A. The following is a summary.

SC36A WG4: Bushings for DC Applications:

A committee draft was circulated and comments were discussed. The following actions were agreed.

- To eliminate the need for DC tests on bushings less than 150 kV

- To allow for preconditioning at the start of the withstand and polarity reversal tests. This is opposed by users and will be discussed within the WG. Comments from IEEE would be welcome.
- To allow a limit of 10 (from 7) pulses above 2000 pC during partial discharge measurements

SC36A MT5: IEC60137 – Insulated Bushings for AC Voltages above 1 Kv:

A committee draft document (36A/94/CDV) was circulated and resulted in affirmative ballot. Edition 5 will be published in 2003.

Due to some comments on impulse test requirements between this document and IEC 60076-3, the committee decided to initiate the revision process to satisfy the objections from TC 14.

SC36A MT6: IEC61463 – Interpretation of Dissolved Gas Analysis of OIP Bushings:

It was agreed to issue a corrigendum to correct a gas concentration ratio in Table 3 giving significant ratios of gas concentrations. The concentration and ratios given in this document are specific to bushings and differ from those given in IEC 60599. SC36A secretary will contact TC 10 and try to align the two documents.

SC36A MT7: IEC61463 – Seismic Qualification of Bushings:

A new team will be set up to review the document, which was published in 1997.

Enquiry 36A/95/DC: Future work on monitoring and diagnosis of bushings:

Despite interest from several National Committees, the enquiry concluded to that there was insufficient experience to prepare a standard. This work was considered to be more suited to CIGRE.

SC17C MT15: IEC 61639- Direct Connection Between Power Transformers and Gas Insulated Metal-Enclose Switchgear above 72.5 kV:

No technical changes are proposed at this time.

CENELEC TC36AWG4: EN - Capacitance Graded Outdoor Bushings up to 420 kV for Oil Filled Transformers:

This is a European Committee parallel to IEC and produces standards/documents for use in the European Committee. As standards, they have legal status and override similar standards in the member states. This will be a dimensional standard and efforts are being made to reach a compromise between the manufacturers and the users. The latest draft will go to the National Committees.

7.6.5 Old Business

7.6.5.1 Reaffirmation of C57.19.100

Reaffirmation of this standard will be submitted to REVCOM in June of 2003

7.6.5.2 C57.19.01- 2000, Tutorial Presentation at the Fall 2003 Meeting in Pittsburgh.

A tutorial to make the members aware of this new dimensional standard will be presented at the next Transformer Committee meeting in Pittsburgh by Loren Wagenaar and others.

7.6.6 Technical Paper Summaries

IEEE Transformer Committee members at the 2003 Doble Client's Conferences in Boston, MA presented the following papers.

- Paper on C57.19.01-2000 (Performance Characteristics/Dimensions) By mark Rivers
- Paper on C2 Power Factor variations By Pritpal Singh
- Paper on Dry Polymer Bushings By Pritpal Singh
- Paper on OIP Bushings with Composite Insulators By Keith Elli

7.6.7 New Business

7.6.7.1 C57.19.01 Switching Surge Comments – Devki Sharma

Devki Sharma presented a comparison of the SW Impulse test levels between C57.19.01 (Bushing Standard) and C57.12.00 (Transformer Standard) and indicated that there is lack of coordination between the two standards. It was pointed out by some of the members that the levels in C57.12.00 were for dry test condition whereas those in C57.19.01 are for wet test conditions and for this reasons the levels in C57.12.00 are higher. Also, in Table 1 of C57.19.01, a note specifies that the dry negative SW Impulse withstand voltage of the bushing must be at least equal to the SW Impulse withstand voltage for the corresponding BIL specified in C57.12.00. This arrangement has been in the bushing standard since 1977 and worked well without any problems. No agreement was made at this meeting. However, members are requested to send their inputs to the Chair or the Secretary if they feel the matter should be discussed at the future meetings.

7.6.7.2 Technical Advisory Group for IEC SC 36A

Outside the Bushing Subcommittee meeting, Scott Choiniski, Program Manager at NEMA, requested for volunteers who are willing to become members of the TAG (Technical Advisory Group) for the IEC SC 36A Committee. He indicated that, we do not have enough US representation in the SC 36A Committee and when decisions are made in this committee, they do not reflect opinions of our industry. Members are requested to contact Scott at the following number/address.

Scott Choinski, Program Manager

TEL: 703 841 3353

E-mail: sco_choinski@nema.org

7.6.8 Adjournment

The meeting was adjourned at 3:40 PM

Minutes Submitted By, Pritpal Singh, Secretary Bushing Subcommittee

7.7 Dry Type Transformers SC – C. W. Johnson, Jr., Chair

7.7.1 Introductions and Approval of Minutes

The Dry Type Transformer Subcommittee met at 1:45 PM on March 19, 2003 with 17 members and 10 guests present; 5 guests requested membership. Introductions were made and the attendance roster was circulated. Minutes from the April 17, 2002 meeting were reviewed and approved.

7.7.2 Working Group Reports

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

7.7.2.1 Dry Type Smoothing Reactors IEEE 1277, Chairman Richard Dudley

- 1 The Dry Type Reactors T.F. met in the Capital Room of the Sheraton Capital Center Hotel in Raleigh, North Carolina on March 17, 2003 from 8:00 a.m. to 9:15 a.m. There were 7 members and 2 guests present. One guest requested membership. The following are the highlights of the meeting.

- 2 Since the work of the group is not covered by a specific PAR the appropriate descriptor is Task Force and not Working Group. The basic scope of the Dry Type Reactor T.F. is to provide expert input on dry type reactors to any standards development process involving reactors. The current effort is the addressing of negative ballots resulting from the reaffirmation process of C57.21 and associated proposed revisions. Other ongoing work associated with future proposed revisions to C57.21 is the development of annexes on TCRs and voltage stresses seen by SRs during switching.
- 3 The Chairman briefly reviewed the current status of the two proposed annexes for C57.21. The annex on TCRs is considered complete. The annex covering stresses seen by SRs during switching has been sent to Roy Alexander of the IEEE Switchgear Committee. Official comments in writing have been requested. No response has been received to date. The Chairman stated that he would follow up with Roy Alexander.
- 4 The status of the reaffirmation process of C57.21 was reviewed and discussed. Peter Balma, who is chairing the reaffirmation process, presented a summary report. The net result of the ballot was 91% affirmative with 5 negatives. Peter has succeeded in getting 4 of the negative balloters to withdraw their negative ballots on the basis that many of their concerns were related to OCR errors and that other concerns would be addressed in the upcoming revision of C57.21. The one remaining negative ballot was discussed. This same negative ballot was discussed at the Vancouver and Oklahoma meetings of the Dry Type Reactor T.F. and was rejected. The T.F. again unanimously rejected the negative ballot. The negative balloter felt that the switching impulse level for dry type shunt reactors should be 70-75% of the lightning impulse level and not 83% as is the case for oil-immersed shunt reactors and, currently, dry type shunt reactors. The same switching impulse levels should be required for dry type and oil-immersed shunt reactors as they are used interchangeably on the power system; function of LA protection practice and characteristics.
- 5 The Chairman's proposals to address comments associated with negative ballots resulting from the reaffirmation process of C57.21 were discussed. Input and comments to these proposals from T.F. members were discussed and taken into consideration. The following are the highlights.

(i) REFERENCES

References will be updated as applicable. Care must be taken to ensure that the technical basis for the reference continues to be valid. This may require that the original specific reference be kept. In other cases it may only require changing the referenced clause etc. in the text of C57.21. References will be reviewed at the end of the revision process for C57.21.

(ii) TEMPERATURE RISE TEST & AUDIBLE SOUND TEST

If a Temperature Rise Test is performed the Audible Sound Test should be carried out at the end of the test since it allows the determination of sound level at operating temperature. If no Temperature Rise Test is performed it is recommended that the Audible Sound Test be carried

out at or near operating temperature. A note will also be added stating that the sound level for oil-immersed and dry-type shunt reactors may vary with temperature.

Two T.F. members noted that Audible Sound Tests for dry type transformers and power transformers are carried out with the transformer at ambient temperature (cold).

(iii) FOOTNOTE 15

Peter Heinzig submitted a correction to the formula in the footnote. It is now mathematically correct. However, Pierre Riffon and Peter Heinzig have carried out sample calculations using the formula and have determined that it only works, at best, for a limited range of data. The footnote containing the formula and the reference to it will be removed. The following sentence will be added to the end of Clause 10.4.3.4.3;

“Since the iron losses cannot be measured on an oil-immersed shunt reactor and since iron losses are typically a small percentage of the total losses, the iron losses based on manufacturer’s calculations should be used.”

(iv) LOW FREQUENCY OVERVOLTAGE TEST

A note will be added to Clause 9.1.3.1 stating that a three-phase supply should be used to perform the Low Frequency Overvoltage Test on three phase oil-immersed shunt reactors connected in delta. The chairman also agreed to contact Ramon Garcia for more background information behind his comment as no T.F. members had any experience re oil-immersed shunt reactors being supplied as a delta connected single unit.

(v) COOLING CLASSES FOR OIL-IMMERSED SHUNT REACTORS

Cooling classes should be identical to those described in C57.12.00 except for the exclusion of water-cooled descriptors.

(vi) PD MEASUREMENTS

Oil-immersed shunt reactors should be treated the same way as oil-immersed power transformers. For voltages > 69kV PD measurements should be taken during the Low Frequency One Hour Overvoltage Test. Levels should be < 500 pC. For voltages < 69kV the Applied Voltage Test is carried out at 2 PU for 7,200 cycles and no PD measurements are required.

Pierre Riffon agreed to prepare a draft of the appropriate clauses based on the criteria above.

(vii) POWER & VOLTAGE CAPABILITIES OF TEST LABORATORIES

Tests should be carried out as described and at levels specified in the standard. Deviations to this practice must be based on a pre-agreement between the purchaser and manufacturer. During the revision process the standard will be reviewed for consistent adherence to this philosophy.

(viii) TURN TO TURN OVERVOLTAGE TEST

From a technical point of view the Turn to Turn Test, currently only applied to dry-type shunt reactors, is also valid for oil-immersed shunt reactors applied at system voltages 34.5 kV and lower. C57.21 will be revised on the basis that the Lightning Impulse Test and Turn to Turn Test are equivalent options for oil-immersed shunt reactors installed at 34.5 kV and lower.

(ix) FREQUENCIES OTHER THAN 60 HZ

A note will be added to Clause 4.3 stating that the standard is applicable to shunt reactors installed on 50 Hz systems with appropriate correction/modification to formulas and test code.

(x) DIGITAL DATA ACQUISITION SYSTEM FOR THE TURN TO TURN TEST

Clause 10.3.3.2 will be modified to include a statement that digital data acquisition systems are recommended for the Turn-to-Turn Test.

(xi) APPARENT CHARGE

Apparent charge acceptance criteria will be added to the One Hour Low Frequency Overvoltage Test for oil-immersed shunt reactors. Pierre Riffon will address this in his draft of clauses covering PD measurements.

(xii) TABLES 5A & 5B

Tables 5A and 5B will be kept separate. However Table 5B will be reviewed to ensure that system related values are the same as in Table 5A; dry-type and oil-immersed shunt reactors are used interchangeably.

- 6 The Chairman stated that a PAR would be raised and the revision process for C57.21 started under the Performance Characteristics S.C. The Chairman (Richard Dudley) stated that he had volunteered to chair the W.G. and that he would prepare a revision of C57.21 based on the above action items plus correcting the OCR errors resulting from IEEE's scanning of the original document. The Dry Type Reactor T.F. will continue to provide input to the W.G. tasked with the revision of C57.21.
- 7 The meeting adjourned at 9:15 a.m.

7.7.2.2 WG Dry Type General Requirements C57.12.01, Chairman John Sullivan

- 1 The meeting of C57.12.01 WG Dry-Type General Requirements was held on Monday March 17th at 1:45 PM in the Willow Oak room of the Sheraton Capital Center, Raleigh, North Carolina.

- 2 The meeting started with the introduction of the members and guests. No meeting was held in Oklahoma City in October 2002. Twelve members and six guests were present. Three guests requested membership.
- 3 The chairman started the meeting with a summary of the standard that will be submitted to IEEE for printing. The chairman indicated that comments made during the Draft three ballot stage have been approved by the working group. Editorial comments were addressed and corrected. The phase diagrams were changed to reflect 120° phase separation. No change was made to the 50 Hz wording. No change was made to enclosure coatings in this revision. A comment was discussed on BIL requirements for 120 volt and 250 volt windings. An attempt to clarify the BIL issue will be made in the next revision. The cooling classes for IEEE and IEC were both listed in this revision so a transition from IEEE classification to IEC classifications can be understood in further revisions.
- 4 The conversion to metric units was discussed. Concern for possible safety problems on weight change may not be acceptable to a mature work force in the transformer industry.
- 5 After discussion and with no further old or new business the meeting was adjourned at 3:00 PM.

7.7.2.3 WG Dry Type Test Code C57.12.91, Chairman David Barnard

- 1 The working group met at 1:45 pm with 16 members and 8 guests present. Six guest requested membership. There are currently 46 members of the working group. It should be noted that many of these members have missed 2 or more consecutive meetings.
- 2 After introductions the chairman asked for comments and/or corrections to the minutes from the Oklahoma City meeting. There being no comments the minutes were approved as written.
- 3 Old Business

Jeewan Puri apologized for not providing a copy of the re-write of Clause 13 in C57.12.90 to include an option for the user to specify sound intensity measurements, as he had promised at the last meeting. There was a communication mix up between Jeewan and the chairman of the C57.12.90 working group. Jeewan will email a copy of the revised Clause to the WG Chair, who will intern send it to all the members for review. Each member is to read and comment on the proposal to include the same wording in the next revision of our standard.

Carl Bush reported on the cooling class designations, which will require revision before the standard is published again. Table 2 and Table 3 of Clause 11.7.3 and 11.8 will need to be modified to comply with the IEEE standard designations.

Mark Rivers proposed changing the last sentence of the note following Table 1 in Clause 10.8.4 concerning insulation power factor measurements, as follows:

“Due to the wide variety of insulating materials used in dry-type transformers, it has not been feasible to establish standard insulation power factor values. However, when field measurements indicate a significant increase over factory-measured values (greater than 2 times factory measurements), changes in the insulation system have occurred and the manufacturer should be consulted.”

The Working Group discussed this proposal and by show of hands voted to not change the existing note. It was noted that power factor testing is not a routine test on dry type transformers.

Max Cambre, who was unable to attend this meeting, did complete his task to review numerous clauses on Resistance Measurements, Dielectric Tests and Temperature testing, which Nigel McQuin objected to during the last ballot. Max presented his comments in written form and the Chair emailed them to all members before the meeting. A task force of volunteers was organized to review this subject and to provide wording for any proposed changes, which would be incorporated in the next revision. The members of the task force include but are not limited to the following: Nigel McQuin, Max Cambre, Derek Foster and Don Kline.

4 New Business

Don Kline informed the W.G. that a guide for making loss measurements, C57.123 is being developed. This guide, which is concerned with very low power factor transformers, includes dry type transformers in its scope

The chairman informed the Working Group that after 15 years as their chairman he would like to be relieved before a new PAR is submitted to IEEE.

5 A motion was made and seconded to adjourn, meeting adjourned at 3:00 pm.

7.7.3 Old Business

- 1 The negative ballots received on the reaffirmations of IEEE Std. C57.12.58 “IEEE Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil” and C57.124 “IEEE Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers” were discussed. Paulette Payne stated she had contacted the negative balloters and they agreed to withdraw their negative ballots by agreeing to address their comments in the next revision.
- 2 Regarding C57.12.58, Max Cambre has provided correctly notated equations for the appendix on page 22. Max stated in his comments that the corrections addressed the use of the proper Greek letters. Max has also proposed updating the calculations used in determining the charging capacitance and tail resistance at 50 microseconds by applying modern computer techniques.

7.7.4 New Business

- 1 The chair gave a report on the activities of the Administrative Subcommittee meeting.
- 2 Sites for upcoming meetings were announced.
- 3 The chair stated that a resolution of the NEMA MOU had been reached and that this subcommittee would now administer the Dry Type standards formerly owned by NEMA. The chairman announced he was looking for working group chairs, vice chairs, and secretaries to administer the new documents. Sheldon Kennedy agreed to become the working group chair for C57.12.52, the product standard for Sealed-Dry Transformers.
- 4 The subcommittee was reminded that the working group members are required to participate and not just attend the meetings. A suggestion was made for working group chairs to consider removing inactive members from the group.
- 5 The chairman thanked Dave Barnard for his efforts as chairman of the working group of C57.12.91. Derek Foster, Olsun Electric Corporation, has agreed to become the chairman of the working group.
- 6 The chairman also thanked Wes Patterson for his efforts as chairman of the Dry Type Subcommittee stating that Wes would be a "hard act to follow". All gave Wes a round of applause.

There being no further business, the subcommittee meeting adjourned at 2:35 PM.

Submitted by C. W. Johnson, Jr., Chair

7.8 Distribution Transformers Subcommittee – Ed Smith, Chair

edsmith@h-jenterprises.com

Meeting Time: 9:30AM, Monday, March 17, 2003

Attendance: 47 Total

25 Members

22 Guests

7.8.1 Chair's Remarks & Announcements:

Review of Administrative Committee meeting highlights by Ron Stahara

- Transformer Standards Activity

7.8.2 Working Group Reports

7.8.2.1 C57.12.20 Overhead Distribution Transformers

(Copyright: IEEE/NEMA – Joint Copyright MOU)

Alan Wilks & Glenn Andersen Co Chairs

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

PAR Status: Current

PAR Expiration Date: End of 2005

Current Standard Date: 1997

Current Draft Being Worked On: 8.1 Dated: March, 2003

Meeting Time: 09:30am, Monday, March 17, 2003

Attendance: 32 Total

17 Members

15 Guests

Issues, Remarks & Announcements:

- Introductions were made and the loss by death of our friend George Henry was noted. The minutes of the last meeting in Oklahoma City were approved. Ron Stahara reported that in the Ad Com meeting yesterday, it was noted that the IEEE Board of Governors is sympathetic to our position regarding metrification. Therefore, we have been directed by our Ad Com to proceed with dual dimensioning of our product standards.
- Our latest draft, 8.1, was reviewed. All of the proposed changes from the last meeting were approved as most were related to US Customary units being shown in footnotes(which will be modified to dual dimensioning in our next draft, 9).
- Proposed paragraph 6.5.4.6, “Cover Grounding”, was reviewed. It was agreed that the cover ground was for static discharge purposed only and the current carrying ability of the grounding mechanism was not important. After considerable discussion, we agreed to reword 6.5.4.6 “Static Cover Bond”. The transformer cover shall be electrically bonded externally to the tank. The location of the bond shall not interfere with the lifting lugs.
- Note 1, Table 6 for 16.34KV only was discussed. As written, Table 6 was unclear and wrong as related to Note 1. It was decided to add a second 95 KVBIL line with Note 1 for 16.34 KV only identifying the 380 mm(15 inch) creep dimensions and 42 and 36 KV withstand levels appropriately.

New Business

- The angle of the tilt was discussed (paragraph 7.2). An unknown user has asked for a maximum angle of tilt. Since the allowable angle of tilt is dependent upon some of the components that may be inside the transformer, a value could not be set. Since all current product standards have

the same angle if tilt wording, we will make a recommendation to our sub-committee to see if there is a better way to describe the angle of tilt and still keep uniform wording.

- The meeting adjourned at 10:45AM

7.8.2.2 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 THIS SESSION***

7.8.2.3 C57.12.25 Single-Phase Padmounted Distribution Transformers

(Copyright: IEEE/NEMA – Joint Copyright MOU)

Ali Ghafourian & Ernie Nols Co Chairs

(aghafourian@ermco-eci.com & ernest.nols@pseg.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: #3, Dated: March 2003

Meeting Time: 11:00AM, Monday, March 17, 2003

Attendance: 40 Total

11 Members

29 Guest

3 Guest Requesting Membership

Issues, Remarks & Announcements:

- The minutes of the October 2002 meeting, in Oklahoma City were approved.
- The C57.12.25 standard will be re-circulated for ballot.
- Draft #3 of the combined Standard C57.12.25 (Dead Front) and C57.12.21 (Live Front) dated March 2003 was submitted. Changes made from the previous meeting were discussed and the document was reviewed. Additional changes and corrections were recommended and they will be included in the next draft.

- A task force was set up to look at tank temperatures of Single Phase & Three Phase padmounted transformers, caused by transformer loading and outside ambient temperatures.
- A motion to include delta connected, line to line, transformers was proposed. The group voted in favor of looking to include this detail in the standard.
- The meeting was adjourned at 12:10PM.

(NOTE: 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)

7.8.2.4 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: Approved

PAR expiration Date: May 09, 2007

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: #1.5 Dated: February 23, 2003

Meeting Time: March 18, 2003 Time: 8:00 AM

Attendance: 41 Total

17 Members

23 Guests

1 Guest Requesting Membership

Issues, Remarks & Announcements:

- The first meeting section was entirely devoted to enclosure integrity issues. The new pry test procedure and tool was presented, reviewed and accepted by the Work Group.
- The minimum padlock shackle size included in section 4.1.8 Enclosure Access was extensively discussed. A Work Group committee was formed to review the three paragraphs in this section.
- The 1.12 inch penta bolt washer maximum is being deleted. There are also additional issues with the english to metric conversion.
- At the October 2002 meeting, it was suggested that a steel probe wire might be more severe. After several Work Group members reviewed steel versus copper, the copper was recommended and will remain in the standard.
- A color range of Hunter DeltaE=4 was recommended and will be reviewed by the Work Group

- The SCAB test and procedure was modified to include internal cabinet coating systems. This proposal received Work Group approval.

7.8.2.5 C57.12.29 Pad-Mounted Equipment Enclosure Integrity for Coastal Environments

(Copyright: IEEE/NEMA – Joint Copyright MOU)

Bob Olen & Dan Mulkey Co Chairs

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

PAR Status: Approved by NES Com May 23, 2002

PAR expiration Date: May 09, 2007

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: #1.0 Dated: September 29 2002

Meeting Time: March 18, 2003 Time: 8:00 AM

Attendance: 41 Total

17 Members

23 Guests

1 Guest Requesting Membership

Issues, Remarks & Announcements:

- Removed “Stainless Steel” from section 5.1
- The substrate weld bead test panel was reviewed. A question related to how a weld bead would be applied to composite materials was discussed.
- The coastal outdoor exposure test was modified to include both external and internal cabinet coating systems.
- A public safety concern related to the hot temperatures which pad-mounted equipment develops in southern states was discussed. This issue may impact the Work Group in the future.
- The meeting was adjourned at 10:43 AM

7.8.2.6 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 06, 2001

PAR expiration Date: December 2006

Current Standard Date: ANSI/NEMA 1996

Current Draft Being Worked on: Dated:
Meeting Times: March 18, 2003 Time: 8:00 AM
Attendance: 41 Total
 17 Members
 23 Guests
 1 Guest Requesting Membership

Issues, Remarks & Announcements:

- Minutes of the October 22, 2002 meeting approved.
- Standard published by IEEE during the first quarter of 2003

7.8.2.7 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 2006
Current Standard Date: ANSI/NEMA 1994
Current Draft Being Worked on: Dated:
Meeting Times: March 18, 2003 Time: 8:00 AM
Attendance: 41 Total
 17 Members
 23 Guests
 1 Guest Requesting Membership

Issues, Remarks & Announcements:

- Standard published by IEEE during the first quarter of 2003

7.8.2.8 C57.12.33 Guide For Distribution Transformer Loss Evaluation

(Copyright: **IEEE**)
Don Duckett & Tom Pekarek Co Chairs
(don.duckett@fpc.com & tjpekarek@firstenergycorp.com)
PAR Status: PAR extension renewed for two years
PAR expiration Date: December 2004
Current Standard Date: October 2001

Current Draft Being Worked On: #9 Dated April 2003

Meeting Date: March 18, 2003 Time: 13:45

Attendance: 35 Total

25 Members

10 Guests

0 Guest Requesting Membership

Issues, Remarks & Announcements:

- The Working Group meeting convened on Tuesday, March 18, 2003, with co-chairman Don Duckett of Progress Energy presiding. There were 25 members and 10 guests present.
- A correction to previous meeting date in Oklahoma City was made on the Minutes of the last meeting in October 2002, was made on the meeting date. Revised minutes were approved.
- Draft 9.0 of the document was passed out to all attendees. Will try to get this version into a form acceptable to the editorial staff and then send it out for balloting before the next meeting.
- Dave Wiegand of Transformer Services commented on the DOE's Project Team concerning transformer losses and efficiencies. The DOE Team has visited several transformer plants both liquid and dry-type manufacturers. Weekly teleconferences on the progress and intent of the DOE activities are being held with the Team. The DOE team is looking at the A and B factors and their effects on the evaluation. A minimum efficiency line such as NEMA TP1 is a possible consideration. The largest savings are expected in the 600v and below DRY types.
- An ANOPER (Advanced Notice of Proposed Rulemaking) meeting is scheduled in May or June 2003, maybe. This will be followed by an NOPER later approximately one year later (2004). DOE rulemaking is expected to be in effect by 2007.
- Tony Bouza is the DOE Program Manager on this issue. Contact phone numbers, as well as a number of DOE documents and worksheets are available on the DOE website addressed to this issue. (www.eere.energy.gov/buildings/appliance_standards).

7.8.2.9 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 2004

Current Standard Date: New Standard

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: 10 Dated:

Meeting Date: 03-17-2003 Time: 01:45 – 03:00 PM

Attendance: 38 Total

20 Members

17 Guests

1 Guest Requesting Membership

Issues, Remarks & Announcements:

- Ron Stahara called the meeting to order, introductions were made, and an attendance roster was circulated.
- Ron stated the document, Draft #9, had passed the ballot with a vote of 62 affirmative(79%) and 16 negative(21%). However, he did point out that of the affirmative votes, there were 8 that had comments concerning their objection to the metric/U.S. customary units presentation in the document. However, in the spirit of compromise, they approved it. Ron covered in detail the comments that were received from SCC10, SCC14 and IEEE Editorial. He emphasized the response from SCC14 that stated the document didn't meet the Metrification Policy. Ron pointed out that he had been directed to write this document in dual dimensions as per the results of an earlier Administrative Subcommittee meeting. Ron pointed out that the standard's dual dimensions will be sustained. His thought was that the dual dimensioned draft (Draft 10) could be balloted and approved by the October meeting.
- Ron then asked the working group to look to the next revision of C57.12.34 and thus a new PAR. He asked the group to consider the following suggestions and determine their position by their next meeting. Some of these came from the negatives during the balloting of PC57.12.34 D9.
 - 1) Change the minimum impedance on 300 & 500 kVA 208/120 ratings
 - 2) Change the maximum Secondary Voltage from 277/480 to 1000 volts
 - 3) Change the Table 2 values based on new calculation philosophy
 - 4) Add a new pad-mount front plate for a three-phase miniature design
 - 5) Make provisions for a grounding attachment point external to the cabinet
 - 6) Remove the barrier between the high and low voltage compartments for dead front units
 - 7) Move the drain valve and sampler to the primary compartment

Meeting adjourned at 3:00 PM.

7.8.2.10 C57.12.35 Bar Coding For Distribution Transformers

(Copyright: **IEEE**)

George Henry Chair

(Note: New Chair required due to George Henry's recent passing)

PAR Status: Active for Reaffirmation

PAR expiration Date: The PAR expires December 2002(*see below)

Current Standard Date: 1996

Current Draft Being Worked On: NONE

Meeting Time: ***DID NOT MEET THIS SESSION***

7.8.2.11 C57.12.36 Distribution Substation Transformers

(Copyright: **IEEE**)

John Rossetti, Leon Plaster & David Aho- Co Chairs

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

PAR Status: PAR Approved June 2002

PAR expiration Date: October 2005

Current Standard Date: NEW Standard Under Development

Current Draft Being Worked On: #1 Dated October 14, 2002

Meeting Date: March 18, 2003 Time: 11:00AM

Attendance: 30 Total

13 Members

13 Guests

4 Guest Requesting Membership

Issues, Remarks & Announcements:

- Minutes from the Oklahoma City meeting were reviewed and approved as written
- For now the document will proceed with dual dimensioning as appropriate
- The focus of this meeting was to assign responsibility to review specific sections of the document. Since the focus of the Oklahoma City meeting was on the "ratings" section, we tried to work on the "construction" section. The following assignments were made,
 - Accessories – Leon Plaster
 - Bushings, Enclosures, Switches & other neutral terminations – Jerry Murphy & Fortin Marcel
 - Lifting/Moving/Jacking, Nameplate & ground pads - Stan Kostyal
 - Polarity & Termination Markings – David Aho
 - Liquid Preservation, Tanks, & Auxiliary Cooling – Rich Von Gemmingen
 - CT's – Steve Shull
 - Arresters – Dave Aho

All others in attendance were requested to review the document and submit comments to either Dave Aho or the person identified as having responsibility for the sections stated above.

Comments should be submitted by the end of May.

Specific Document Comments:

- 1) Rating tables will provide standard limits for voltage ratios and voltage limits based on KVA ratings. A request was made to provide some guidance on how to deal with exceptions to these limits.
 - 2) This document, as currently written, doesn't address the requirements of sidewall-mounted bushings very well. Items like Bushing Terminations, Bushing Supports, Enclosure Sizes and Mechanical Clearances need to be addressed.
 - 3) Although this standard is for Distribution Transformers, the bushing section will need to address "Power" Bushing, since these are very common.
 - 4) A comment to remove the word "Revenue" from the CT section defining the type of accuracy class was discussed. Steve Shull will review.
- A revised draft of the document will be distributed to all Working Group members by the end of March. Mr. Marcel offered to act as a liaison with the Switchgear Committee to obtain comments.
 - With no further business, the meeting adjourned at 12:00PM.

7.8.2.12 C57.15-200XStep-Voltage Regulators

(Copyright: **IEEE**)

Craig Colopy & Gael Kennedy Co Chairs

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

PAR Status: Approved July 27, 2000

PAR Expiration Date: April 2004

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

Current Draft Being Worked On: Draft 2.0 Dated: March 2003

Meeting Date: Tuesday, March 18, 2003 Time: 3:15PM

Attendance: 28 Total

11 Members

17 Guests

3 Guest Requesting Membership

Issues, Remarks & Announcements:

- Introduction by all present

- Draft 2.0 document was e-mailed to the committee on Friday, March 07, 2003
- Minutes from last meeting were approved (moved by Ron Stahare, 2nd by Glenn Anderson)
- Dual dimensioning to be maintained in Draft 2.
- Showed draft organization sheet to document the comments of the Working Group for revisions to be included in rev 3.
- Walked through Draft 2.0; requested comments back by the end of June so the update can be discussed at the Pittsburgh meeting.
- Updated this draft to match C57.12.00 and C57.12.90. _5.2 need to be sure to buy what matches the substation requirements 55 vs 65, but match the kVA ratings for the installation.
- 5.4 The limiting factor in past has been the load tap changing requirements.
- Table 3-6 have the international flavor and include both the 50/60 hz design.
- Table 11 is for both 50/60 hertz units – need to update title.
- Table 12 limits to 200kV BIL
- 5.8 Short Circuit requirements (distribution switchgear defines maximum preferred rating
- 5.9.2.1 added statement from C57.12.00
- 6.7.1.2.f added new paragraph regarding the weight criteria versus the kVA criteria
- Table 14 – four-hole spade or threaded stud, so the user can apply their own. Maybe add another column for diameter and threading of studs. Add note that other terminations are available for user to specify. Threaded stud with four-hole spade. Change title to “Recommended Bushing Terminal Connectors”?
- 7.2 Section added. 25 times base rated or 25 times normal full load current. User needs to install limiting reactors not the regulator manufacturer. User responsible to install other means to limit fault currents.
- 7.2.a recommend that this be lowered to 500 kVA versus 750 kVA 500n matches the 5MVA transformer capacities
- 8.5.4.2 Impedance voltage added new explanations.
- 8.7 Revised and replaced with what was in C57.12.90
- 8.9.4 Winding temperature revised to allow for metric or US Customary units
- 9.4.1.4 Added to include EMI testing C37.90.2
- 9.4.2.1 Updated test voltage to 1500 volts instead of the 1000 volts; AC test is pass/fail.

- Comments requested on the total document. These should be turned into Craig by the end of June 2003. A copy of the Draft and the form will be e-mailed to attendees.

Questions, areas for more discussion:

Ratios in 8.3.2 tolerances for ratio came from C57.12.00 need to interpret for regulators.

Note for voltage regulators should not be on nameplate voltages. The ratios between control and shunt windings must be somehow noted and defined. 0.5% is over the entire range?

Lots of comments and discussion; a very good meeting.

Adjourned at 16:30.

7.8.2.13 C57.12.37 Electronic Reporting of Test Data (formerly P1388)

(Copyright: **IEEE**)

Richard Hollingsworth & Thomas Callsen Co Chairs

(rhollin@howard-ind.com & Thomas.Callsen@ExelonCorp.com)

PAR Status: PAR Expiration Date

Current Standard Date: Published under IEEE Std. 1388-2000

Current Draft Being Worked On: D10

Meeting Date: March 17, 2003

Attendance: 21 Total

16 Members

5 Guests

0 Guest Requesting Membership

Issues, Remarks & Announcements:

- The draft is being edited and advancing to the balloting stage.
- Discussion was opened regarding the next phase of the standard. We will request a new PAR to change the scope. We are going to drop the liquid immersed restriction so we can pick up the dry type transformer reporting. We will also be expanding the scope to include regulators.
- Until the next phase is active, we can report dry type transformers by defining the insulating fluid as “none”.
- Data compression is an option that can be agreed upon between user and manufacturer.
- This document will **not** cover any form of encryption.
- If a manufacturer has multiple plants in the same city, it must identify the city and an identifier must be used to indicate where the transformers were manufactured.

- Under the postal service delivery, we addressed 2 topics.
 - A) The user must provide the address for the delivery and
 - B) Changed the restriction from 3.5 inch diskette to removable storage media
- We will be providing an Appendix with some useful formulas. A task force to identify useful formulas has been set.

Members of the Task Force are:

Ron Kirker
Tom Callsen (Excelon West)
John Borst (ABB)

- Add reference documents for Regulators (C57.15) and Dry Type (?)

7.8.2.14 C57.144 Guide to Metric Conversion of Transformer Standards

(Copyright: **IEEE**)

Dudley Galloway/Tim Olson

(gallowaytt@aol.com)

PAR Status: Active

PAR Expiration Date: April 2006

Current Standard Date: New Document

Current Draft Being Worked On: D3 Dated: March 2003

Meeting Date: March 17, 2003 Time: 3:15PM

Attendance: 18 Total

11 Members

6 Guests

1 Guest Requesting Membership

Issues, Remarks & Announcements:

- Steve Shull chaired the meeting for Dudley Galloway who was unable to attend.
- Draft 3 had been distributed prior to the meeting; changes included:
 - 1) Rewritten per IEEE Standards Style Manual
 - 2) Uses the style sheet Version 6.2 from IEEE-SA
 - 3) Use of the CSA guide as a reference was deleted
 - 4) CSA Guide updated to 2000 and listed in the Bibliography
 - 5) Examples from PC57.12.34/D9 were included as a normative annex
 - 6) Sub-clause 3.17 on “force and mass” was rewritten

7) The word “probably” was added to the last sentence of Sub-clause 3.6

- A question was raised concerning the preference between: “0.5-13UNC” vs. “1/2-13 UNC”. This was thought to be more of a DT SC decision than a guide issue.
- It was noted that if dual dimensioning is ultimately allowed, then convenience rounding should be avoided or at least used with caution.
- Mike Culhane agreed to provide an updated version of his conversion spreadsheet.
- It was noted that the Working Group needs a co-chair to help Dudley.

7.8.3 Subcommittee Old Business:

None reported

7.8.4 Subcommittee New Business:

None reported

7.8.5 Liaison Report – Transformer Committee Website Development

The website development task force met at breakfast this morning. This meeting was chaired by Susan McNelly and attended by approximately 30 people.

Moving forward, we are going to give more access to the committee chairs in an effort to prevent Susan from being overloaded. With this in mind, we have setup a secure area on the committee website where documents and other files can be placed by committee groups. This will include drafts, meeting minutes, drawings, etc. It should be possible for working group chairs to place documents at this site and inform the members through an email that the document is available. We can also have Susan place a link on the website.

Access to the website will be by password:

Name: xfmrcom

Password: Trs34acc

The password is to change twice/year – on the Friday after the committee meeting. The Account Name will not be changed.

There was a discussion on how a working group (etc) could make use of this new website. Currently this will be up to the individual group to decide. We should be mindful of keeping the clutter to a minimum.

There were also discussions on how long the minutes of the meeting should be kept online. It was decided the minutes will be kept in DOC and PDF format (in the grid) for 3 meetings. Then the DOC files will be moved off line (archived) and the PDFs will be moved to a separate page.

Minutes Submitted by Ed Smith, Chair

7.9 Dielectric Tests SC – Loren Wagenaar, Chair

The Dielectric Test Subcommittee (DTSC) met on Wednesday, March 19, 2003, at 1:30 p.m., in Raleigh, NC with 73 members and 51 guests present. 16 of the guests requested membership on the Subcommittee. See the last page of these minutes for attendance lists.

7.9.1 Chairman's Remarks

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on March 16, 2003.

- 1) The test case for metrification, C57.34, three-phase pad-mounts, resulted in significant unrest among balloters and a mixed reaction from different bodies within IEEE. The preference among users seems to be to allow dual dimensions. The IEEE Standards Board is meeting this week and will be reviewing this issue
- 2) Minutes due to Don Fallon and Sue McNally on May 9.
- 3) Next meeting dates and locations are as follows: October 5-9, 2003 in Pittsburgh, Pennsylvania. Potential hosts for future meetings should contact Greg Anderson (gwanderson@ieee.org).
- 4) Minutes of the Oklahoma City meeting are available on the IEEE Committee Web Site.
- 5) The O&P (Operations & Procedures) Manual for the committee will be revised. Since balloting is now done with balloting pools, there is no longer such a thing as a "voting member" of the committee. This is one of the items that will be changed. Another is recognition of corresponding members.
- 6) Eric Davis has been attending the WG on website development as a representative of the subcommittee. Eric and Loren will be working together to establish a website for the subcommittee. It is Loren's intent that future minutes and other correspondence be posted on the website instead of sending out voluminous e-mails for these purposes.

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 on October 23, 2002 in Oklahoma City were approved as written.

7.9.2 Working Group Reports

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

38 members and 36 guests attended the meeting.

Minutes of the previous meeting October 21, 2002 in Oklahoma City, OK were approved.

Announcements included:

- Arturo Nunez is WG Secretary
- Panel discussion: Detection and Location of Acoustic Emissions from Partial Discharges will be this afternoon
- The IEEE-SA Standards Board on February 13, 2003 approved the project "PC57.127-Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors" until December 31, 2007.

Under the leadership of Alan Darwin, Mark Perkins, Hem Shertukde and Barry Ward, the WG edited sections of the Guide including continuous monitoring systems, characterization of acoustic emission signals and calibration.

The WG also presented a panel session on the Detection and Location of Acoustic Emissions from Partial Discharge. Presenters were Andreas Garnitschnig of VA Tech Elin, Chair Jack Harley, Hem Shertukde of Diagnostic Devices, Steve Skinner and Wes Clark of Idaho Power, and Barry Ward of EPRI.

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

The WG met with 21 members and 29 guests in attendance. 5 people requested membership. The minutes of the OK City meeting were approved as written.

The first item of business was a presentation and discussion on temperature correction of the power factor test. Actual case study data demonstrated that the real variation of power factor vs temperature can be in the opposite direction as the ANSI or other correction factors.

The Chairman presented a chart of calculated temperature correction factors developed using dielectric frequency response software and showed how this matched field and factory data.

The consensus of the WG was that the power factor test in the factory should not be corrected to a reference temperature, but only the measured value and the average oil temperature reported. The WG will develop temperature correction curves based on calculated parameters (% moisture in insulation, oil conductivity, and % paper in oil in the insulation structure). These curves will be for field comparison purpose and will be forwarded to the appropriate WG.

The Chairman then reported that C57.113 on Partial Discharge was reaffirmed and that a Task Force will be organized to begin work that will ultimately result in a revision of the document. A Chairman will be selected and membership solicited at the Subcommittee meeting.

It was announced that when the next revision of C57.12.90 is published (probably before the next meeting) apparent charge will be the standard method for measurement of partial discharge rather than RIV. The Chairman also indicated that a common partial discharge system used in many factories will need to be operated in an analog detector mode rather than digital mode to conform to C57.113. Users needing more details can contact the Chairman.

The meeting adjourned at 12:15 PM.

7.9.2.3 Working Group on Revision of Impulse Tests – Pierre Riffon, Chair; Peter Henzig, Vice-Chair

The WG met on March 18, 2003, from 3:15 pm to 4:30 pm. 14 members and 20 guests attended the meeting. 2 guests requested membership.

The minutes of the Oklahoma City meeting were approved as written. The agenda has been approved as written. Mr. Peter Henzig has been nominated as the vice-chair of the WG.

The main subject on the agenda was to review a new proposal regarding the minimum impulse generator energy level to be met during lightning impulse tests for cases where the 50% tail time is shorter than the minimum allowable value of 40 μ s. Minimum requirements within the transformer industry have to be given in order to get a fair competition between manufacturers and to ensure users that transformers are adequately tested. This subject has been discussed since 1998.

This new proposal was based on the following parameters:

- A minimum tail time of 40 μ s.
- Energy values were determined to cover 80% of studied cases.

New calculations have been performed according to Oklahoma City meeting decisions.

The new proposed energy levels are much lower than proposed during the last meeting. In addition, a formula is now given for the calculation of the minimum impulse generator energy needed to obtain a minimum tail time of 40 μ s. This formula is function of the BIL, winding rated voltage, generator efficiency, leakage impedance and MVA rating.

After a lively discussion, a new proposal has to be worked out considering the following decisions taken during the meeting:

- Category IV (10 MVA to 600 MVA, single phase rating) has to be split in at least three sub-categories (IVa, IVb and IVc) because this is a too wide power range. This will give lower energy requirements for mid-band of that power range.

- Transformers classified as Class I (highest system voltage rating ≤ 69 kV) has to be treated separately. Lower requirements have to be specified for that transformer class.
- Reconsider the minimum energy value for the class covering the highest MVA ratings (part of the actual class IVb). The proposed value of 100 kJ seems to be too restrictive.

A new proposal considering the least of the values given in the table or calculated from the formula will be presented. This will considerably reduce the minimum energy requirement for most of transformer ratings.

All WG members were requested to evaluate the proposal and to provide feedback to the WG chair via Email prior to the next meeting (Email address: *riffon.pierre@hydro.qc.ca*).

The meeting adjourned at 4:30 pm on March 18, 2003.

7.9.2.4 Working Group for Revision of the Impulse Test Guide C57.98 – Art Molden, Chair; Joe Melanson, Secretary; Pierre Riffon, Acting Secretary

Attendees: 46, of which 15 where members and 31 where guests. The minutes of the meetings of April and October 2002 were approved.

Reference material for this working group is being made available via an IEEE “grouper” site and comments and communication are circulated using our majordomo WG email list. Both these services are operating smoothly and without comment!

So far, none of the individual contributions to the revision of this guide have been made available to the membership group. Members were therefore encouraged to provide clause revisions for group discussion.

It was reported by the WG chair that the next revision of IEEE Standard 4 will include revisions to certain measurement procedures that would be of interest to this WG:

- 1) A method of defining the “effective” peak voltage of a lightning impulse that contains overshoot, the so called “k factor” method, will be included as an alternative to the presently used methodology.
- 2) The reference to a 50% undershoot magnitude for chopped waves will be removed and a statement will be added to the effect that, undershoot magnitude must be specified by the appropriate technical committee.

A handout was provided that highlighted the main items contained in the “Minimum IG Energy” proposal that is being discussed in the WG for Revision of Impulse Tests. This minimum energy proposal relates the ability of an impulse generator to produce the required minimum tail time of 40 μ s, to its available stored energy and the kVA rating of a transformer. There is overlap here in the scope of this project and that of The Revision of Impulse Tests. Various comments were made by the members, regarding alternative methods that could be used to achieve the same result and the efficacy of these methods were discussed but no consensus was achieved.

The meeting adjourned at 4:30 pm

7.9.2.5 Task Force on Liquid-Filled Transformers Dielectric Test Table – Phil Hopkinson, Chair

The Working Group met on Tuesday, March 18 at 1:45 PM with 21 members and 33 guests present. The Chairman presented a draft version of section 5 on ratings from C57.12.00, which included three tables to replace the existing five tables. The new tables will be; wye connected, delta connected, and high frequency relationship.

There was much discussion on these topics. The Chairman will consolidate and make the agreed upon modifications and distribute to the working group for additional feedback. More discussion will be had at the next meeting in Pittsburgh.

The meeting adjourned at 3:00 PM.

7.9.3 Liaison Reports

7.9.3.1 Surge Protection Devices – Bob Degeneff

Nothing to report.

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

The meeting took place in Lake Placid NY during February 10th and 11th. There were nine members present.

Much of the meeting was taken up with discussion of various drafts of revised sections of Standard 4. There were three items discussed that would be of particular interest to the Transformers Committee members, and these were:

- Round Robins
- Measurement of lightning impulse (LI) voltages that contain overshoot
- Measurement of chopped wave (CW) parameters.

Round Robins

This item has been on the agenda for quite some time and I've reported that the project is soon to be underway on more than one occasion. Well, it is soon to be underway and for those of you who may have forgotten what this project is all about, here is a short synopsis.

- Two reference measuring systems are to be circulated amongst participating test laboratories in North America, a 200 kV, 60 Hz ac voltage measuring system and a 200 kV

lightning impulse VOLTAGE measuring system. Participants will be required to compare the reference system with their own “regular” system in a predetermined series of comparison tests. A copy of the comparison test results are then to be provided to the members of HVTT. Both NIST and NRC are slated to participate in this project so on completion of the project each participant will receive a comparison of their “regular” system with those of the National Laboratories.

- The two systems will be circulated independently and participants can elect to take part in one or both comparisons.
- Participants will be expected to follow, very carefully, the required test protocols and to complete the comparisons within a week of receiving the system. The work involved in performing the comparisons is expected to be about a half a day for ac and a full day for impulse. All prospective participants should therefore be prepared to schedule the required comparison testing time into their operating schedule.

One more time, will all those interested in becoming a participant in this Round Robin please contact either Jim McBride at Jim@jmxservices.com or myself at A.Molden@ieee.org.

LI impulse waves with overshoot and CW parameters

These topics were reported on at the meeting of the WG for Revision of Transformer Impulse Tests. The next revision of Standard 4 will include an alternative procedure for determining the “effective” amplitude of an LI that includes overshoot on the voltage peak, The present criteria (500 kHz/ 1 us half period and 5 % magnitude) that are used to determine the peak voltage of a LI containing overshoot, result in some creative and controversial measurements of impulse voltage records. In an attempt to resolve these difficulties various institutions around the world have been attempting to redefine the overshoot criteria. Based on the results of a study of the breakdown of insulation samples that were subjected to LI voltages with controlled amounts of overshoot, new criteria have been proposed. The new criteria relate a magnitude factor “k” of the overshoot to its frequency, in a smooth continuous function across the frequency band. A Procedure for implementing this “k factor method” will be proposed.

The reference in Standard 4 to modification of the CW circuit so as to limit the undershoot if it exceeds 50% will be removed and replaced by a statement to the effect that the amount of undershoot should be specified by the relevant technical committees.

Also, regarding chopped waves, it was recognized that during tests on low impedance windings the voltage collapse of a chopped wave might be damped to such a degree that there is no undershoot. Such damped voltage collapse could yield extraordinary long “time to chop” results when measured using the 70% and 10% points of the collapse as the measurement criteria. Any alternative means of making such measurements if required, should be specified by the relevant technical committees.

The meeting adjourned at lunchtime on February 11th.

7.9.3.3 Performance Characteristics Subcommittee TF on Frequency Response Testing – Rowland James

Discussed the initial draft of the Guide related to how the various methods, sweep, impulse, and enhanced, will be combined and included in the FRA Testing Guide. General wording was discussed to ensure consistency. A brief discussion regarding termination impedance, 50 Ohms or 10 Ohms, resulted in showing that 50 Ohms was more common and accepted as a standard for network analyzer measurements. Both impedances will still be considered.

For the sake of efficiency in producing a complete draft of the Guide, the chairman proposed that a detailed outline of the Guide is produced and reviewed for input from the TF members and then additional material is requested from the different members in their areas of expertise.

There is concern for adapting a versatile data format.

7.9.4 Old Business

7.9.4.1 Phase to Ground Clearances – Loren Wagenaar

A brief presentation was made by Loren. Previous discussions have centered on the fact that NESC (National Electric Safety Code), which is concerned only with the safety of workers working in substations, specifies phase to ground voltages. There are two pertinent rules for phase to ground clearances:

The first rule specifies that the nearest exposed part shall have a clearance to ground according with tables provided in the NESC. These are based on impulse and switching surge voltages appearing on terminals. If used, protection provided by arresters is taken into account.

The second rule specifies that all indeterminate voltages, i.e., the bottom surface of an exposed bushing or arrester porcelain, shall be 2.6 m (8.5 feet) above ground level.

Pierre Riffon commented that it is not within our scope to place these safety requirements within product standards; however, we are concerned with phase to ground clearances based on minimum physical clearances, which Pierre called “insulation coordination” clearances. These clearances affect the reliability of the transformer as well as transformer costs.

Bertrand Poulin commented that Canadian Standard CAN/CSA-C99-M90 gives external phase to ground clearances as a function of BIL. These are almost the same as given in IEC 76-3, except that they cover higher BILs.

It was also noted that phase to phase clearances have no effect on the safety of workers, and these clearances are not covered by the NESC. However, the subcommittee has an interest from an insulation coordination aspect. Bertrand Poulin commented that the present phase to phase clearances given in Table 13 of C57.12.00 are not adequate for all cases.

See the website for more additional detail.

There are several issues that should be discussed before a definite proposal can be made. To this end, Loren will circulate a survey within the subcommittee. These issues include:

- 1) Do we need to differentiate in C57.12.00 between the safety clearances presently given in the NESC (IEEE C2) and the insulation clearances?
- 2) Do we refer to NESC table or add tables for the safety clearances?
- 3) Do we need to establish insulation coordination clearances for inclusion in C57.12.00?
- 4) Are changes necessary for the phase to phase clearance given in Table 13 of C57.12.00?
- 5) If so, should the values be in better harmony with IEC and CSA Standards?
- 6) Should EHV system voltages be tied to switching impulse voltages instead of system voltages?

7.9.5 New Business

7.9.5.1 Core Megger testing

This subject was introduced at the last meeting by Dan Perco.

Robert Veitch commented that core ground resistors had been shown not to be a good practice. Loren Wagenaar added that AEP spec does not allow resistors, but they have added them temporarily in order to control currents on transformers rather than have a non-intended core ground.

This item will be referred to the WG on Power Frequency Tests. Wayne Hansen indicated that he will be sending further comments to the chair.

7.9.5.2 C57.138 Reaffirmation

C57.138 Impulse testing on Distribution Transformers (Recommended Practice) needs to be reaffirmed. It seems to be up to date. Unanimous by a vote of hands that the reaffirmation ballot will be sent through the pool process.

7.9.5.3 C57.12.00 and C57.12.90 Review

Subhash Tuli sent about 40 emails last week on the ballots for C57.12.00 and C57.12.90 pertaining to issues that need addressed by DTSC. The Chairman will review these and refer them to the proper working groups.

Minutes Submitted by Steve Antosz, Secretary

7.10 HVDC Converter Transformers & Smoothing Reactors SC – R. F. Dudley, Chair

The S.C. met in the Governors II Room of the Sheraton Capital Center Hotel in Raleigh, North Carolina on March 17, 2003 from 1:45 – 3:00 p.m. There were 7 members and 6 guests present. The following are the highlights.

- 1) The issue of how to handle transformers utilized in conjunction with HVDC schemes based on voltage source converter technology was discussed. This technology is relatively new and is continuing to evolve. There are different schemes and the operating stresses seen by the transformers may vary. With voltage source converter technology the harmonic currents typically seen by the transformer are low but the harmonic voltages are a function of the filtering. Another important aspect of voltage source converter technology is that there is no DC on the valve winding and therefore the DC tests required for converter transformers used with current commutated converters do not apply. No load losses are also an important aspect of transformers used with voltage source converters.

The final conclusion was that the technology for voltage source converter based HVDC schemes is continuing to develop and thus it is premature to have a separate standard. It is perhaps best to include an informative annex in the next revision of IEEE C57.129. Peter Heinzig and Pierre Riffon agreed to produce a first draft. Peter Heinzig stated that he had a paper that contained useful information. It could be listed in the Bibliography of the annex. Members of the S.C. are requested to identify other useful papers.

The scope of IEEE C57.129 should be reworked. The main body of the standard covers converter transformers utilized in conjunction with current commutated converters. Transformers utilized in conjunction with voltage source converters will be covered in an annex.

- 2) Annex A will be expanded to include various loss measurement methodologies. Peter Heinzig's draft write-up on the use of impedance analyzers to determine the Harmonic Loss Factor and a description re the use of electronic wattmeters will be integrated into Annex A. Robin Taylor and Alan Forest will draft the portion on the use of wattmeters.

- 3) Waldemar Ziomek's draft annex on overloading of converter transformers will form the basis for an annex of broader scope. There should be more emphasis on test code. What is the appropriate test methodology especially if there is a low ambient overload? Guidelines are required especially if testing is carried out under a normal ambient. Pierre Riffon will draft a section on testing and limits. The main concerns under overload are losses in core, clamping structures, tank etc.

Peter Heinzig will redraft Clause 5.2 to include details on how to specify overloads for converter transformers. The real issue is how to specify replacement converter transformers. New converter transformers are part of a "turn key" system supply. Input will be sought from Les Rickseidler of Manitoba Hydro re the specification of replacement converter transformers as he has just gone through a large replacement program. Pierre Riffon will contact Les re input.

- 4) At the upcoming PES meeting in Toronto in July 2003, RFD will attend appropriate meetings in the HVDC technology area to ascertain if proper coordination is being maintained; equipment standards (IEEE C57.129, IEEE 1277) vs systems orientated documents.

The meeting adjourned at 3:00 p.m.

Submitted by Richard F. Dudley, Chair

7.11 Instrument Transformers SC – Jim Smith, Chair

9 members and 9 guests attended

7.11.1 Chair's Remarks & Announcements

The dates and locations for future meetings were announced.

The previous meeting minutes were approved as written

7.11.2 Old Business:

IEC 270-1981 (Partial Discharge Measurements) was reviewed. Pierre Riffon will compare the new version (600270) to the latest C57.13 document. Tony Jonatti questioned whether we should have a general PD standard or one specific to Instrument Transformers. Vladimir Khalin will send the IEC Common Clause std to members by Email.

7.11.3 New Business

7.11.3.1 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. Jim Smith presented a document for discussion. Mechanical loading during thermal testing was included because of the effect on gaskets, etc. This may be feasible for Medium Voltage but members expressed concerns for EHV devices. Pierre Riffon suggested using the min-max service temperatures (incl. Trise) rather than the fixed values in the document. He also said it would be difficult in some cases to maintain 15 deg C/hr and recommended 10 deg C/hr. Jim Smith said that the electrical performance should be verified at the temperature extremes, but that most environmental chambers do not have electrical test capabilities, particularly for the highest voltages. Tony Jonatti suggested a Thermal Shock test with PD measurement. The members were generally in agreement that thermal testing is desirable but have concerns about the practicality and cost. This issue will remain within the subcommittee for now, but may move to a TF or WG at a later date. Members were invited to send comments to Jim Smith before the next meeting.

7.11.3.2 Interpretation of C57.13

A request was received for an interpretation of C57.13 regarding Impulse testing of bushing CT's. Jim Smith will respond

7.11.4 Working Group Reports:

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

The WG met on March 18, 2003. Eight members and fifteen guests attended the meeting. Three guests requested membership. The meeting was co-chaired by Mr. P. Riffon and Mr. R. McTaggart. Mr. J. Ma was not able to attend the meeting.

Minutes of the Oklahoma City meeting were approved as written.

No negatives ballots were received on the re-circulation ballot on C57.13.5. RevCom will review the document on March 19, 2003. The document will probably be published during summer 2003.

A new normative Annex (Annex H) on unbalance current transformers for use as unbalance current protection of capacitor banks has been presented. This Annex is intended to be added to C57.13.5

when this Trial-Use standard will be due for revision as a full-use standard (in approximately one year from now).

The main topics discussed were:

- Description of the particular design aspects of unbalance current transformers;
- Description of the specific phenomenon involved in case of a capacitor bank fault;
- Mitigation measures to limit the overvoltage that can appear across the primary winding;
- Specific requirements including specific phase-to-ground rating as well as BIL rating across primary terminals;
- Specific routine tests including a lightning impulse tests across primary terminals;
- Specific type tests including a lightning impulse tests across primary terminals. Calculations can be provided for the verification of temperature rises in lieu of performing an heat run test;
- Specific tests on voltage limiting devices (ZnO arresters and spark gap).

Some editorial corrections and additional clarifications need to be implemented. In addition, the proposed energy level during impulse tests (25 kJ) will be reviewed during the upcoming meeting. Data from actual test results will be presented. The Annex will also be formatted according to the IEEE format. Members are requested to provide comments on this Annex for the upcoming meetings.

A PAR will be requested for modifications to IEEE 57.13.5 as soon as it will be issued in order to be ready in one year time from now.

7.11.4.2 WG C57.13.6 – Working Group on Instrument Transformers for use with Electronic Meters and Relays – Chris TenHaagen

Chair's remarks & Announcements:

The subcommittee met on March 22, in Raleigh, NC, with 6 members and 8 guests present.

Old business-

- It was suggested to require four test points for the 0.15 S accuracy class. Countering this is the argument some designs can be shown to inherently meet this standard using only two test points. Resolution pending.
- Action Items:
 - Need a Par for this draft.
 - The standard will be forwarded to the editorial staff.

New business-

- Par was granted on February 13, 2003, expiring December 31, 2007
- Draft reviewed by Editorial Staff
- It was resolved that paragraph 6.1.1 and 6.1.2 will be combined as follows:

6.1.1 0.15 and 0.15S Accuracy Class Current Transformers

A total of four test readings must be made. At 100% rated current, using burden E-0.04, and the maximum burden for which the transformer is rated to meet this accuracy class, the ratio and phase angle readings must meet transformer correction factor limits specified in table 1. At 5% rated current, using burden E-0.04, and the maximum burden for which the transformer is rated to meet this accuracy class, the ratio and phase angle readings must meet limits specified in table 1. A current transformer type can be certified to this standard when demonstrated to inherently meet the stated accuracy class using the following two test points: At 100% of rated current using burden E0.04, and at 5% of rated current using the maximum burden for which it is rated.

With final acceptance of the above paragraph, and some minor editorial improvements, a survey of the group indicated that there was unanimous agreement that the standard was ready for ballot. The Chair of this WG will accomplish this at the earliest possible date.

7.11.4.3 Working Group on C57.13 Revision – Tom Nelson

Meeting was held on March 18, with 18 members present.

The draft standard survey of the working group and the subcommittee is complete and the draft has been reviewed by IEEE editorial and their comments have been incorporated into the standard. The draft is ready for balloting by IEEE, except IEEE refused the PAR extension which would allow us to ballot the draft. The 1994 version will be reaffirmed by the subcommittee, and then a new PAR will be requested from IEEE, after which the draft standard will be submitted to IEEE for balloting. This will likely occur around the time of the fall meeting. It was noted that some of the references will need the years changed as they have been revised since the list was put together.

Comments and suggestions for the next revision of the standard were started, with a paragraph needing to be written for resolving a failure of PD testing.

There were suggestions to fold in C57.13.5, and C57.13.6 into the next revision also.

7.11.4.4 Study Group IEEE Std C57.13.2 – Vladimir Khalin

The group met on Tuesday, March 18 at 3:15 PM with 12 members and guests present. After reviewing the results of a preliminary survey it was agreed to form a working group on the revision of the Standard. The group discussed a variety of issues including the voltage and current test levels.

The group suggested:

- The PAR has to be developed and submitted to IEEE-SA
- The Standard has to be sent to the editorial staff for pre-ballot review.

Submitted by Ross McTaggart, Secretary

7.12 Insulating Fluids SC – F. J. Gryzkiewicz, Chair, R. K. Ladroga, Vice-Chair

(Report at meeting presented by Susan McNelly)

7.12.1 Introduction/Attendance

The Insulating Fluids Subcommittee and its Working Groups met in Raleigh, North Carolina on Tuesday and Wednesday, March 18 and 19, 2003. The Subcommittee started its meeting at 11:00 a. m. on Wednesday. There were 20 members and 20 guests present.

7.12.2 Approval of Meeting Minutes

The minutes of the October Oklahoma City, Oklahoma meeting were approved as printed.

7.12.3 Old Business

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

This document was approved by the IEEE Standards Board in June of 2002 and was printed in

November of 2002.

A Working Group has been formed to review the information in Tables 4 and 5 of this document. These tables, which contain test values based on dynamic and equilibrium moisture in oil parameters, resulted in two negative ballots being cast for the Recirculation Ballot of C57.106. Since the Recirculation Ballot resulted in a 97% approval (IEEE bylaws require a 75% approval for consensus to be met.), the document was submitted to Revcom for approval. Revcom approved the revision of this document at their June 2002 meeting.

Jim Thompson and T.V. Oommen are the Co-Chairs of the Working Group. The Working Group will meet at the next meeting in Pittsburgh to further discuss what action should be taken.

7.12.3.2 C57.104 – IEEE Guide for the Interpretation of Gases Generated in Oil – Immersed Transformers

This Working Group is chaired by Frank Heinrichs. This document recently completed a Standards Association Ballot. Several negative ballots were received. The negative ballots will be resolved and/or rebutted. A Recirculation Ballot is in the process of being conducted.

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

This Working Group is co-chaired by Frank Heinrichs and Frank Gryszkiewicz. This document has been sent to IEEE for a Standards Association Ballot.

7.12.3.4 C57.111 – IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers.

Kent Haggerty and Jim Goudie are the Working Group Co-Chairs. Kent and Jim reported that this guide still contains state of the art information. In view of this, the Subcommittee decided to send the document out for a Standards Association Reaffirmation Ballot.

7.12.3.5 C57.139 – IEEE Guide for Dissolved Gas Analysis in Load Tap Changers.

Rick Ladroga is the Working Group Chair for this project. The Working Group met on Tuesday, March 18, 2003 with 47 in attendance.

In the past, the Working Group had a difficult time agreeing on dissolved gas analysis(DGA) limits for

the different design type load tap changers. The Working Group Chair formulated a table containing ranges of the combustible gases of interest for the various design types of load tap changers. This table was discussed at the Working Group meeting.

As a result of the discussions, the Working Group was advised that this Guide also contain information on the use of ratios of the various combustible gasses in determining whether the DGA data is indicative of a tap changer problem.

The Working Group will prepare a new draft which will be discussed at the next meeting in Pittsburgh.

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

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

Jim Goudie and Bill Bartley are the Working Group Co-Chairs of the document. A Standards Association Recirculation Ballot is in the process of being conducted.

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

A successful Reaffirmation Ballot was recently conducted on this document. The IEEE Standards Board approved this document at their meeting in December of 2002.

7.12.3.8 C57.XXX – IEEE Guide for the Acceptance and Maintenance of Natural Ester Based Fluids.

A Working Group, consisting of the following, has been formed to work on this project:

Patrick McShane – Chair
T.V. Oommen
Alan Wilks
Kent Haggerty

The Working Group will obtain a PAR and prepare Draft 1 for discussion at the next meeting in Pittsburgh.

7.12.4 Adjournment

The Subcommittee adjourned at 12:20 p.m.

7.12.5 Next Meeting

The Insulating Fluids Subcommittee and its Working Groups will next meet in Pittsburgh, Pennsylvania, October 5-9, 2003.

Submitted by Frank Gryszkiewicz, Chair

8.0 Editor's Report – M. Christini

Between October 2002 and April 2003, a total of (34) papers and in the transformer area were submitted to IEEE Transactions on Power Delivery (20 new, 14 revised). During this time (21) reviews were completed and (13) reviews are in-progress. For completed reviews, the recommendations were: Accept without changes (9), Revise and Resubmit (10), and Reject (2). A complete summary of these papers is listed below.

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

TPWRD-00057-2002.R2	Seismic Response of Transformer-Bushing Systems	Ersoyl
TPWRD-00160-2002.R2	A Simplified Transformer Thermal Model Based On Thermal-Electric Analogy	Tang
TPWRD-00213-2002.R1	Procedures for detecting Winding Displacements in Power Transformers by the Transfer Function Method	Christian
TPWRD-00246-2002.R2	Vibro-acoustic techniques to diagnose power transformers	Bartoletti
TPWRD-00354-2002.R1	An Improved Low Frequency Transformer Model for use in GIC Studies	Chandrasena
TPWRD-00359-2002.R1	Wide Band Modeling of Power Transformers	Gustavsen
TPWRD-00446-2002.R2	Geometric Effects in the Electrical Breakdown of Transformer Oil	Delvecchio
TPWRD-00511-2002.R1	Aging of impregnated paper in power transformers	Lundgaard
TPWRD-00513-2002.R1	Investigation of an Expert System for the Condition Assessment of Transformer Insulation Based on Dielectric Response Measurements	Saha

Revise and Resubmit

TPWRD-00057-2002.R1	Seismic Response of Transformer-Bushing Systems	Ersoyl
TPWRD-00160-2002.R1	A Simplified Transformer Thermal Model Based On Thermal-Electric Analogy	Tang
TPWRD-00246-2002	Vibro-acoustic techniques to diagnose power transformers	Bartoletti
TPWRD-00246-2002.R1	Vibro-acoustic techniques to diagnose power transformers	Bartoletti
TPWRD-00359-2002	Wide Band Modeling of Power Transformers	Gustavsen
TPWRD-00390-2002	Numerical Determination of Losses in the Tank Walls of Pad-Mounted Transformers: A Two-Dimensional Approach	Olivares
TPWRD-00446-2002	Geometric Effects in the Electrical Breakdown of Transformer Oil	Delvecchio
TPWRD-00446-2002.R1	Geometric Effects in the Electrical Breakdown of Transformer Oil	Delvecchio
TPWRD-00511-2002	Aging of impregnated paper in power transformers	Lundgaard
TPWRD-00513-2002	Investigation of an Expert System for the Condition Assessment of Transformer Insulation Based on Dielectric Response Measurements	Saha

Reject

TPWRD-00432-2002	Fractal Analysis of Impulse Fault Patterns in Distribution Transformers	Purkait
TPWRD-00459-2002	Research on the transience process of the tap change in the load-ratio voltage transformer considering the ferromagnetic characteristic	Wan

Still In Progress

TPWRD-00390-2002.R1	Improved Insert Geometry for Reducing Tank Wall Losses in Pad-mounted Transformers	Olivares
TPWRD-00456-2002	Transformer Fault Diagnosis Using Standard Codes with Excel and Probabilistic Network	Lin
TPWRD-00473-2002	Effects of Symmetrical Voltage Sags on Three-phase Three-legged Transformers	Guaschl
TPWRD-00503-2002	FEM-3D Magnetic Field Analysis for Metrologically Improved	Cundeval

	Design of Combined Current-Voltage Instrument Transformer	
TPWRD-00012-2003	An Evidential Reasoning Approach to Transformer Condition Assessments	Tang
TPWRD-00015-2003	Deriving an Equivalent Circuit of Transformers Insulation for Understanding the Dielectric Response Measurements	Saha
TPWRD-00039-2003	Estimation of the Hottest Spot Temperature (HST) in Power Transformers Considering Thermal Inhomogeneity of the Windings	Pradhan
TPWRD-00056-2003	Sensitive online PD-Measurements of on site Oil/Paper-insulated Devices by means of optimized Acoustic Emission Techniques (AET)	Grossmann
TPWRD-00064-2003	Application of Fractal Techniques for Analysis of Impulse Fault Patterns in Distribution Transformers	Purkait
TPWRD-00066-2003	Experimental Investigation of Internal Short Circuit Faults Leading to Advanced Incipient Behavior and Failure of A Distribution Transformer	Butler
TPWRD-00072-2003	Development of a DC Current-Blocking Device for Transformer Neutrals	Bolduc
TPWRD-00079-2003	A Novel Fault Diagnosis Model for Power Transformer Based on Evidence Theory	Dong
TPWRD-00104-2003	Fault Diagnosis of a Power Transformer Using an Improved Frequency Response Analysis	Kim

All members of the IEEE Transformer Committee are invited to review technical papers. To review IEEE Transaction Papers on transformers, please sign up at: <http://tpwr-d-ieee.manuscriptcentral.com/>

INSTRUCTIONS FOR SIGNING UP TO REVIEW IEEE TRANSACTIONS PAPERS

1. Before you create a new account, please check for an existing account by clicking on: "Check for Existing Account"
2. Assuming that you do not get an existing account notification email, click on "Create New Account" and enter in your information.
3. Please specify any "Specialty / Area of Expertise" according to the 5 numerical codes below:
 - 13a: Power and Instrument Transformers
 - 13b: Insulating fluids category
 - 13c: Dielectric Testing
 - 13d: Audible Noise and Vibration
 - 13e: Transformer Modeling Techniques
4. Please specify any "Key Words" such as: distribution transformers, core losses, oil DGA, or thermal, for example.
5. Submit your information

Submitted by Mark Christini, Editor

9.0 Meetings Planning Subcommittee -- G. W. Anderson, Chair

The Meetings Planning Subcommittee (Mtgs SC) holds an open meeting at each 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, March 19, 2003 in the Sheraton Capital Center Hotel in Raleigh, North Carolina, USA. Fourteen (14) 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 February 1, 2003) \$13,787.82. Greg thanked the recent Meeting Hosts for working hard to control expenses and help with stewardship of the Committee's funds.

9.2 Past & Present Meetings

9.2.1 Past Meeting - Oklahoma City, Oklahoma, USA (October 20-24, 2002)

Joe Garza and the Host Team at Southwest Electric Company did an excellent job of planning and implementing the meeting in Oklahoma City. Joe and his team enlisted professional meeting planning services of Ms. Jennifer Anderson at ASE Productions, Inc. Despite the continued depressed economy, the attendance was good (286 attendees and 37 companions/spouses).

During our Tuesday Luncheon (176 attendees), Historian, Humorist & Formal Oklahoma Governor Mr. George Nigh entertained us with a humorous presentation with a southern flavor. On Wednesday evening, we enjoyed country line dancing and a sit-down barbeque dinner at the new Cowboy Hall & Western Heritage Museum (200 attendees). On Monday, 32 companions enjoyed a memorable tour of the National Memorial Center, and strolled through the Hefner Mansion and Myriad Botanical Gardens. On Tuesday, the 25 companions enjoyed a tour of the historic town of Guthrie and a guided tour of the Scottish Rite Temple.

Two technical tours were offered at this meeting and attendance for both tours was restricted (by invitation of the company). On Sunday morning, two bus-loads of people visited Southwest Electric's transformer plant and enjoyed a barbeque lunch. An additional 8 people attended a repeat tour of that facility on Thursday afternoon.

A big thanks to ABB, Pennsylvania Transformers, and Waukesha Electric for sponsoring coffee breaks and helping us maintain a low meeting registration fee.

9.2.2 Present Meeting - Raleigh, North Carolina, USA (March 16-20, 2003)

Meeting Host Ray Nicholas gave a brief report of the on-going meeting. Attendance was good (332 attendees and 41 companions). The entire ABB Host Team did a great job of planning and implementing the meeting. A special thanks to Ms. Beverly Jenkins from ABB's Raleigh Office for her hard work.

The speaker for our Tuesday Luncheon (207 attendees) was Mr. John W. Estey, President and CEO of S&C Electric Co. and current President of the IEEE PES. Mr. Estey gave a sobering presentation that challenged us all to continue concentrating on the technical aspects of our business and encouraged employees to continue supporting standards development. On Monday, 99 people participated in a "working luncheon" while Tom Prevost reviewed the procedures in developing standards. This event was very well accepted and we hope to hold it at least once a year.

On Wednesday evening, 166 people attended dinner at the North Carolina Museum of Art. On Monday, 33 companions/sponsors enjoyed shopping at the Triangle Town Center and lunch. On Tuesday, 33 companions/sponsors enjoyed a trip to Duke Chapel and Sara Duke Gardens located at Duke University in Durham, and then returned to Raleigh for a lunch at the Cardinal Club and a tour of the State Capital Building.

On Sunday morning, a group toured Waukesha Electric System's transformer plant in Goldsboro, North Carolina. On Thursday afternoon, a group toured ABB's Small Power Transformer Facility in South Boston, Virginia. Attendance at both tours was restricted (by invitation only).

Special thanks to DryKeep USA, SMIT Transformers, and Siemens for sponsor coffee breaks at this meeting and helping us defray the cost of the meeting.

9.3 Future Meetings

9.3.1 Summary

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

- October 5-9, 2003 -- Pittsburgh, Pennsylvania, USA, at Sheraton Station Square. Hosted by Dennis & Merritt Blake and Pennsylvania Transformers Technology, Inc.
- March 7-12, 2004 -- San Diego, California, USA at the Catamaran Resort Hotel. Hosted by Ron Kirker and San Diego Gas & Electric (Sempra Energy Utilities).
- September 19-23, 2004 (likely date) -- Edinburgh, Scotland. Hosted by Jim Fyvie and VA TECH Peebles Transformers.

Possible locations for future meetings include: Jackson, Mississippi; Memphis, Tennessee; New York or New Jersey (near IEEE HQ); Minneapolis; Denver; Branson, Missouri; and Montreal to name a few.

9.3.2 Upcoming Fall 2003 Meeting (October 5-9) -- Pittsburgh, Pennsylvania, USA

Pennsylvania Transformer Technologies, Inc. (PTTI) will host the Fall 2003 Meeting in Pittsburgh, Pennsylvania. Dennis & Merritt Blake will be the Host and Hostess. The meeting will be held at the Sheraton Station Square Hotel, Pittsburgh's only riverfront hotel. Room rates are \$135/night (without taxes), single or double occupancy.

Events planned for the companions/spouses include tours of the Pennsylvania Amish/Dutch Country and "Fallingwater", Frank Lloyd Wright's most acclaimed example of architecture. The Wednesday Evening Dinner Social will be at the National Aviary.

Three technical tours are planned. On Sunday morning, we will go to Pennsylvania Transformer's transformer plant. On Monday evening, we will go to Mitsubishi Electric Power Product's circuit breaker plant. On Thursday afternoon, a second tour of PTTI's transformer plant will be offered.

Dennis Blake at PTTI can be reached by phone at (724) 873-2123 or by e-mail at dennis.blake@ieee.org.

9.3.3 Upcoming Spring 2004 Meeting (March 7-12) -- San Diego, California, USA

Ron Kirker gave a brief summary of the Spring 2004 Meeting. The meeting will be hosted by Ron and his wife and San Diego Gas & Electric (a Sempra Energy Company). The meeting will be held at the Catamaran Resort Hotel located on the beach on Mission Bay. Room rates are \$145/night (without taxes), single or double occupancy.

Technical tours are planned of Edison ESI Repair Facility. Ron is considering a cruise on Mission Bay for the Wednesday evening activity. Companion/spouse events under consideration are a full-day trolley tour through the Old Town & Coronado areas and/or a full-day trip to the Temecula Wineries. Other events under consideration include visits to the Del Coronado Hotel, Palomar Observatory, Sea World, San Diego Zoo/Wild Animal Park, Balboa Park, Birch Aquarium at Scripps, Point Loma (Cabrillo National Monument), the Indian Casinos (Viejas), and/or a 1/2-day ferry ride to Seaport Village or breakfast or lunch on Shelter Island.

Ron Kirker at SDG&E can be reached at (858) 654-8274 or at ron.kirker@ieee.org.

9.4 Working Group Report

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

The working group meeting was held at 7:00 am on Wednesday, March 19, 2003. In spite of its early hour, the meeting was well attended with 22 people present (17 identified themselves as SC, WG or TF

representatives, 8 were new attendees).

9.4.1.1 Meeting Agenda

The agenda for the meeting was as follows:

1. Introductions
2. Latest Changes
3. Archives
4. Other Issues?
5. Adjournment

9.4.1.2 Latest Changes

There was a brief discussion and demonstration of the use of the SC and WG web-pages. Also, the use of the private directory for posting of draft standards and other documents that needed to be kept in a protected area were discussed.

Art Molden indicated that his WG used a folder on the Grouper Server for keeping working files that all in his group could access. Sue McNelly indicated that she would look into whether this is something that could be done with the Transformer Committee web site, possibly by using the private directories, and will report back at the next meeting.

Ownership of the SC web pages and WG pages by their chairs was again stressed. A template for creating new pages will be developed for WG Chairs to use.

9.4.1.3 Archives

The group discussed how much information should be kept available on-line and in what format. Minutes will be left on the site, but after they are bumped from the page with the last three meetings worth of minutes, they will be kept in Adobe PDF format only rather than in both MS-Word and PDF formats. Also, only the full minutes, rather than the separated minutes will be kept on-line.

Greg Anderson brought up the subject of Historian. He indicated that he would like someone to consider taking on the role of Transformer Committee Historian. He would like to possibly have a CD developed with all the past Committee minutes on it if that would be valuable to the members. It would possibly be done as an anniversary gift to members.

9.4.1.4 Other Issues

Peter Balma brought up the idea to have a balloting form on-line for members to use when responding to ballots to make the format that comments are submitted more uniform and easier to compile. This was discussed and it was decided that this should be brought to the Standard SC's attention. No other issues were raised and the meeting was adjourned.

9.5 New Business

9.5.1 Mailing of Meeting Minutes

Minutes for this Spring Meeting will be "snail-mailed" to all Committee members and the attendees of the meeting. As in the past, the cost for printing and mailing that document was included in the registration fee. This will be the last time that we will send printed meeting minutes via mail. In the future, the web-site will be the primary source for that document. For the Fall 2003 Meeting and subsequent meetings, we will charge a slight fee (probably US\$15) for printing and mailing printed meeting minutes (in paper format).

Another issue is that the present format of our minutes is not "web-friendly". It is worthwhile that we consider reorganizing and reformatting the document as a web-based document. This issue will be addressed in a future meeting and assistance is needed.

9.5.2 Tutorials/Presentations

Two technical tutorials/presentations were presented at this Raleigh Meeting and they continue to "exceed all expectations". Material from each of the presentations is available on the Committee's web-site.

The following presentations were presented at the Fall Meeting:

- "Detection and Location of Acoustic Emissions from Partial Discharge", by Garnitschnig, Harley, Shertukde, Skinner, and Ward.
- "Switching Transients Induced by Transformer/Breaker Interaction", by Degeneff, Hopkinson, and Tobin.

Future candidate presentations include: Net Meetings (On-line Meetings and Remote Conferencing), Web-based Review of PES Technical Papers, Winding Temperature Measurement (by McClure and others), Ester-based Fluids (by McShane, Oommen and others), a Summary of Changes in the Bushing Standard (Moisture in Transformers (by TV Oommen), Loss Tolerance & Measurement (by Ramsis Girgis), and National Energy Policy (by Phil Hopkinson). A future presentation is also being planned on the impact of over-voltage on core overexcitation (by Girgis, Moore, B. Patel, and Preininger).

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

We are still considering creating a "WG for Educational Development" 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

At the Oklahoma City Meeting, we started a pilot program to allow three companies to sponsor coffee breaks to help with the cost of the meeting. We continued opportunities for "break patrons" and Joe Watson administrated the process. We highlighted the sponsors in the meeting schedule and indicated their patronage on signs located in the break area. Representative from the companies were allowed to distribute commercial information (flyers) during that time. We will continue to cautiously experiment with this and develop a policy to foster vendor relationships and help maintain our low registration fees, while keeping a technical focus. We will also develop new signage. Contact Joe to apply for future sponsor opportunities.

9.5.4 Schedule Changes - New Lunch & Breakfast Meetings

At the Oklahoma City and Raleigh Meetings, three special meetings were held during breakfast and lunch timeslots to avoid conflicts with other meetings. The WG for Web-page Development was held as a Wednesday morning breakfast meeting. Attendees picked-up their breakfasts and brought it to a nearby room for the meeting. At the Raleigh Meeting, the "Newcomers Orientation" (typically facilitated by the Committee Vice-chair) was held during the Monday breakfast timeslot. Also in Raleigh, a review of the standards development process (facilitated by the Standards Coordinator) was held as a Monday working lunch meeting. The meetings worked well in these timeslots and we will continue to monitor the success of holding meetings during at these times.

9.5.5 Committee Historians

At the Spring 2002 Meeting, Greg suggested that the Committee document and archive the history of the Committee; i.e. old meeting minutes, old photos, etc. It was proposed that a group of "historians" (or "old timers") develop a plan to gather old meeting information for permanent archiving. It was suggested that we should create an "anniversary CD" that will contain an assembly of documents and meeting minutes from the past 10-15 years. The CD could perhaps be presented as a gift to all Committee Members and made available to meeting guests and other interested individuals. We continue to look for someone to champion this effort.

9.6 Miscellaneous

Additional topics were discussed:

We are still investigating a way of coordinating and consolidating our membership databases and we are looking at several outside companies that provide such services, including integrated on-line meeting registration systems. We presently maintain and use several non-relational databases: the Committee

"mailing list" maintained by SC Secretary, the attendee list for each 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 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 three times. 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 work 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 9/11 Event and the depressed economy have affected our meeting attendance and participation. We need to develop a contingency plan and look for opportunities to continue work during such situations. We need to learn to work more efficiently between normal scheduled Committee meetings. Greg suggested that one WG or TF plan and hold a "between meeting" Internet or telephone conference and report the results (how it went, etc) to the Committee at a future meeting. Tom Prevost will consider a WG or TF project that would be a candidate to hold a mid-meeting on-line conference. Note: We continue to look for a candidate project.

Again it was noted that the Committee's "Marketing Flyer" is available on the web-site. It is encouraged that everyone download and print this two-page document and distribute it at local conferences, seminars, and IEEE meetings.

Finally, a big thanks to Sue McNelly who developed a special web-page for the use of our companions/spouses. To help us all "place names & faces", there is a collection of photos of couples located in a secure area on the web-site. The page may be accessed with the user-name and password announced at each meeting (note the password changes every six months).

The meeting was adjourned.

Respectfully Submitted, Greg Anderson, SC Chair

10.0 Reports of Liaison Representatives

Status Reports on transformer related projects had previously been provided by EPRI during this section of the Meeting. In the interest of conserving time during the Main Meeting for topics that all attendees can access and/or participate in, the EPRI Status Reports were not requested for the Raleigh Meeting. Attendees can access EPRI information through the EPRI website at www.epri.com

There was no activity requiring a CIGRE Liaison Report during the /Raleigh Meeting. An update report is anticipated for the next Meeting in Pittsburgh.

10.1 SCC4 - P. A. Payne

March 20, 2003

Liaison Report to the IEEE/PES Transformers Committee Standards Coordinating Committee on Electrical Insulation – SCC 04

1. 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. 2003 Objectives and Goals:

- **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 if IEC 62114 is adopted otherwise, IEEE 99 will be revised for consistency with IEEE 1.

As several Transformer Committee standards reference IEEE 99, applicable standards will be identified and notification will be given to Transformer Committee officers and appropriate Subcommittee and Working Chairpersons to state their position whether to (1) adopt IEC 62114 and withdraw IEEE 99, or (2) revise IEEE 99.

Submitted by Paulette A. Payne

10.2 TC 14 TAG - P. J. Hopkinson

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

TAG Administrator:
National Electrical Manufacturers Association

1300 North 17th Street, Suite 1847, Rosslyn, VA 22209
Tel: 703-841-3253, fax: 703-841-3253

-----MINUTES

PLACE OF MEETING: **SHERATON CAPITAL CENTER HOTEL**
421 South Salisbury Street
Raleigh, NC 27601

DATE AND TIME: Wednesday, March 19, 2003
3:00 PM

PRESIDING OFFICER: P. Hopkinson, Technical Advisor

Members Present:

C. Colopy	Cooper Power Systems
J. Foldi	Consultant
D. Foster	Olsun Electronics Corporation
P. Hopkinson	Hvolt, Inc.
S. Kennedy	Niagara Transformer Corporation
R. Marek	Dupont Advanced Fibers Systems
W. Patterson	ABB
P. Payne	PEPCO
J. Sim	Waukesha Electric Systems

Members Absent:

J. Corkran	Cooper Power Systems
R. Girgis	ABB
C. Ko	Lapp Insulator Company
J. Lackey	Ontario Power Generation
G. Morehart	ACME Electric Corporation

Others present:

S. Choinski	NEMA Staff, TAG Administrator
D. Baruard	Weidmann Systems International
K. Haggarty	Dupont
W. Henning	Waukesha Electric Systems
T. Hochanh	Hydro-Quebec
D. Low	Howard Industries
D. Marlow	GE Prolec
J. Puri	Hvolt, Inc.
P. Riffon	Hydro-Quebec

R. Thompson
H. Zarmandilly

Duke Energy – Energy Delivery Services
Square D Company

1. CALL TO ORDER

The meeting was called to order, attendance recorded and NEMA antitrust guidelines were reviewed.

2. APPROVAL OF THE AGENDA

The agenda was approved as written

3. APPROVAL OF THE PREVIOUS MINUTES

Minutes of the meeting held October 23, 2002, were approved as written.

4. REVIEW AND UPDATE OF USNC ROSTERS FOR TC 14

Members reviewed the TAG roster and made necessary corrections.

5. REPORT ON TC 14 WORKING GROUPS

Reviewed the US representatives for the WG's.

- a. WG 26 – Tap Changers – C. Colopy - A CDV is due for circulation. TAG Administrator to circulate to TAG when issued.
- b. WG 2 – Short Circuit – J. Corkran -
- c. WG 21 – Convertor Transformers – S. Kennedy
- d. WG 25 – Audible Sound – Open (Formerly J. Puri)
- e. WG 27 – Dry Type Transformers – W. Patterson. A replacement will be required due to Mr. Patterson's new business position. C. Johnson has been suggested.
- f. WG 24 – Dielectric Tests – Open (Formerly L. Wagenaar)
- g. WG 29 – High Temperature Insulation Systems – R. Marek (Convenor)

TA reported that the TAG lost members as a result of the fee imposed by USNC. It is in the industry's best interest to have as much support in developing the US position within the IEC. Documents will be circulated to paying and non-paying members. Only fee-paying members may vote, however, all comments may be considered.

6. REPORT ON SMB/2547/QP

Norwegian NC appeal against a decision of TC 14: in 14/460/RCV on 14/448/CDV Draft IEC 60076-11. The appeal is of a fire test for dry type cast resin transformers supported by

France. The US supported the Norwegian appeal, however, there were not enough votes to accept the appeal.

7. REPORT ON 14/461/NP

Japanese NC submitted a new work proposal (NWP) for IEC 60076-15: Gas-filled-type power transformers. US submitted a negative vote opposing the NWP.

8. OTHER BUSINESS

Mr. Sim reported that IEEE and IEC have a dual logo agreement. Details aren't available, but is an avenue to explore for NWP's. Mr. Riffon reported that IEEE standards may be referenced in IEC documents.

9. TIME AND PLACE OF NEXT MEETING

The next meeting will be held in conjunction with the Fall IEEE PES Transformer Committee meetings in Pittsburgh, PA.

10. ADJOURNMENT

The meeting adjourned at 4:20 PM EST.

Reported By:

S. Choinski

March 19, 2003

11.0 Old Business

11.1 O&P Manual Update

The Secretary indicated that the Committee Organization and Procedures (O&P) Manual is due for its bi-annual review and update before the end of the year. The Secretary plans to work with the Vice-Chair on this update, and outlined several items that have come up during Administrative SC Meetings that should be considered in this review:

- **Membership requirements** – On the reverse side of the membership application form in the O&P Manual “participation” for at least one year in WG and SC activities is listed as part of the eligibility requirements, while the text of the Manual includes “Contributing regularly as a member of Subcommittee(s) and Working Group(s) during a one year apprenticeship period.” The inconsistency between these two areas in the Manual has resulted in some questions from applicants and in the need to defer action on some applications. The Administrative SC affirmed that both membership and participation in WG’s and SC’s for one year be part of the requirements for Committee membership, and the application form will be updated to be more consistent with this requirement. The Committee encourages all attendees to actively participate and become full members. This change will clarify one of the requirements.
- **Voting Member** – This terminology most likely stems from the time when only Committee members could ballot on Standards documents. With the present open ballot process, that wording is no longer relevant. “Voting Member” will be replaced with “Member”.
- **Corresponding Member** – In order to avoid quorum problems while attempting to determine “Committee” positions during Meeting votes, the Secretary has suggested Corresponding Membership to several Members who have difficulty regularly attending. That has resulted in questions on the requirements for Corresponding Membership, and a review of the O&P Manual reveals no discussion on the subject. Per discussion at the Administrative SC meeting, requirements will be included in the O&P update, and the requirements will include all regular membership requirements but excluding the requirement for regular attendance at meetings.

The Committee website (<http://www.transformerscommittee.org/>) provides access to the O&P Manual. Any suggestions for needs for revision of the O&P Manual should be brought to the attention of one of the Committee Officers.

11.2 Balloting Pool

The Committee has the responsibility to work with IEEE to set up the “automatic” ballot pool for Transformer Committee ballot documents. The “automatic” ballot invitation pool will be set up to consist of all Committee Members (including Emeritus, Life, and Corresponding Members). For each individual ballot, the pool will be supplemented with the WG Members for the balloted document. With the IEEE open ballot process all ballots are open to any who wish to ballot, provided they maintain their

IEEE SA (Standards Association) membership, or pay the individual ballot fee. This re-defining of the automatic ballot pool will help assure that there is a core of interested and involved individuals invited to ballot on Committee documents.

11.3 Meeting Minutes

This will be the last Meeting for which printed copies of the assembled Minutes will be distributed to all Meeting attendees and to all Members. Starting with the Fall 2003 Meeting in Pittsburgh, electronic posting of Minutes on the Committee website will be the primary means of Minutes distribution. For the near future, printed copies will still be made available (at cost during the Meeting registration process) to those who wish to purchase them. Pricing will be based on estimated cost, and is expected to be approximately \$15. A Reflector E-mail message will provide updates, and the Secretary plans to send a hardcopy letter to all members to notify them of this change.

There were no other items of old business raised for discussion.

12.0 New Business

There were no items of new business raised.

13.0 Adjournment

The meeting was adjourned at 11:10 AM.

Respectfully submitted,

Donald J. Fallon, Secretary

ATTACHMENT 1 STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

02-Sep-03

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE 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 9/2000
None					
SUBCOMMITTEE: BUSHING					
CHAIR: F. E. ELLIOTT					
PHONE: (360)619-6099					
C57.19.00	GENERAL REQUIREMENTS AND TEST PROCEDURES FOR OUTDOOR APPARATUS BUSHINGS (IEEE 21)	ELLIS, K. (615)847-2157	PSIM IEC SC36 IA/PSE ICC	7/23/91 6/20/96 2002	Standard extended until Dec 2004 PAR extended until Dec 2004
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
C57.19.03	STANDARD REQUIREMENTS, TERMINOLOGY AND TEST CODE FOR BUSHINGS FOR DC APPLICATIONS	F. E. ELLIOTT (360) 619-6099		6/20/96	reaffirmed Dec 10, 2002
NONE					
C57.19.100	GUIDE FOR APPLICATION OF APPARATUS BUSHINGS.	ELLIOTT F. E. (360) 619-6099	SWGR SUB PSR	3/16/95	Balloting Reaffirmation Standard Extended until 12/2003
NONE					
NEW	TASK FORCE TO STUDY APPLICATION AND PROBLEMS OF DRAW-LEADS FOR BUSHINGS	NORDMAN RUSS (414)547-0121			NEW TASK FORCE
NEW					

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE PARDATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: DIELECTRIC TESTS					
CHAIR: L. B. WAGENAAR					
PHONE: (614)552-1759					
C57.113	GUIDE FOR PARTIAL DISCHARGE MEASUREMENT IN LIQUID-FILLED POWER TRANSFORMERS AND SHUNT REACTOR	PERKINS M. [314]382-2100	PSIM IAS/PSE IEC TC14 U	12/5/91 2007	Reaffirmed 12-20-02 PAR withdrawn 12/10/02
C57.127 PC57.127	GUIDE FOR THE DETECTION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS	J. W. HARLEY (216)425-1838	ICC PSIM IEC TC14 U	9/20/00 2/13/03 2005	Has been granted Full-Use status
C57.138 NONE	RECOMMENDED PRACTICE FOR ROUTINE IMPULSE TEST FOR DISTRIBUTION TRANSFORMERS	ROSSETTI J. (901)528-4743	T&D IA/PSE PSIM	3/19/98 9/19/96 2003	
C57.98 PC57.98	IEEE GUIDE FOR TRANSFORMER IMPULSE TESTS	Moulden, A. (845) 225-0993	NONE	12/2/93 9/11/02 2004	New PAR approved 9/02

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 PC57.12.20	OVERHEAD-TYPE DISTRIBUTION TRANSFORMERS, 500 kVA AND SMALLER; H V 34500 VOLTS AND BELOW, L V 7970/13800Y &	ANDERSEN GLEN WILKS, A.		6/20/96 PAR for revision approved Feb 2002 2/1/02 2001	
C57.12.23 PC57.12.23	UNDERGROUND-TYPE, SELF-COOLED, 1-PHASE DISTRIBUTION TR WITH SEPERABLE INSULATE HV CONNECT HV 24940GrdY., LV, 240., 167kVA.	Trant A., Lee R.	T&D IAS/PSEC IC IAS/REPC	6/12/02. Revised Standard approved June 2002 3/18/99 2007	
C57.12.25 PC57.12.25	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 Recirculating Ballot 12/8/98 1995 PAR extended until Dec 2004	
C57.12.28 PC57.12.28	Standard for Pad Mounted Equipment - Enclosure Integrity	OLEN / MULKEY 262-835-3362		5/1/02	
C57.12.29 PC57.12.29	Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments	OLEN / MULKEY 262-835-3362			
C57.12.31	Standard for Pole Mounted Equipment - Enclosure Integrity	OLEN / MULKEY 262-835-3362		9/11/02 2007	
C57.12.32	Standard for Submersible Equipment - Enclosure Integrity	OLEN / MULKEY 262-835-3362		9/11/02 2007	
C57.12.33 PC57.12.33	GUIDE FOR EVALUATION OF LOSSES IN DISTRIBUTION TRANSFORMERS	PEKAREK T. DUCKETT, D.	PSIM	6/1/98 Ballot closed 4/1999	PAR extended until 12/2004 Ballot closed 4/1999
C57.12.34 PC57.12.34	REQUIREMENTS FOR THREE PHASE PAD-MOUNTED DISTRIBUTION TRANSFORMERS	Shull, Stahara (417)625-5100	ICC	12/6/00	Par extended until 12/2004 Being Balloted
C57.12.35 NONE	STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)	Henry, G.		6/20/96 Need to revise/reaffirm by 12/02 2001	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
C57.15 PC57.15	REQUIREMENTS, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE REGULATORS	KENNEDY, G. COLOPY, C.	SUBS IAS/PSE	9/16/99 12/6/00 2004	
IEEE1388 Pc57.12.37	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: C. JOHNSON					
PHONE:					
C57.12.01	GENERAL REQUIREMENTS FOR DRY-TYPE DIST. SULLIVAN J. TR, 1-500kVA, 1 PHASE, AND 15-500kVA, 3-PHASE &/or RESIN-ENCAPSULATED WINDINGS	(813) 228-4111	NEMA IA/1&CPS U.L. ANSI	9/1/98 Balloting 3/1/99 2003	
C57.12.50	REQ. FOR VENTILATED DRY-TYPE DISTRIBUTION SULLIVAN J. TR, 1-500kVA, 1 PHASE, AND 15-500kVA, 3-PHASE HV 601-34500VOLT, LV 120-600V	(813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE statu 1994	
C57.12.51	REQ. FOR VENTILATED DRY-TYPE POWER TR, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS	(813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE statu 1994	
C57.12.52	REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLTS	(813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE statu 1994.	
C57.12.55	CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS	(813) 228-4111		4/7/86 Need PAR for revision to get ANSI/IEEE statu 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
C57.12.58	GUIDE FOR CONDUCTING TRANSIENT VOLTAGE ANALYSIS OF A DRY-TYPE TRANSFORMER COIL	PAYNE P (202) 388-2138	IEC IAS	9/19/96 Reaffirmed 6/2002 6/28/78 2007	
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 SC15E NEMA	3/19/98 REVISION APPROVED 3/98 6/26/97 2003	WOULD LIKE TO COMBINE WITH C57.12
C57.12.91	TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS	AND FOSTER D. (815) 678-2421	SPD EM T&D	12/6/00 Approved Dec 6, 2000 IEC TC14 2005	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE 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	PAYNE P. (202)388-2138	NONE	6/29/91 6/27/91 2007	REAFFIRMED 6/12/02
C57.134	GUIDE FOR THE DETERMINATION OF HOTTEST SPOT TEMPERATURE IN DRY TYPE TRANSFORMERS	PAYNE P. (202)388-2138		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 SERIES CONNECTED REACTORS	DUDLEY R. (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	PATTERSON W. (919)848-1860		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	
IEEE 259 None	TEST PROCEDURE FOR EVALUATION OF SYSTEMS OF INSULATION FOR SPECIALTY TRANSFORMERS	SIMPSON R. W. JR. (603)284-4362		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 PSIM	6/1/00 2005	
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	PUB DATE 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 12/2003 Par withdrawn, Need new PAR
C57.13.2	CONFORMANCE TEST PROCEDURE FOR INSTRUMENT TRANSFORMERS	KHALIN V. (859) 879-2797			
C57.13.5	TEST REQUIREMENTS FOR INSTRUMENT TRANSFORMERS OF A NOMINAL VOLTAGE OF 115KV AND ABOVE	Ma J.	SWGR EM TC 38 US T	3/20/03 9/19/96 2008	Trial Use Guide approved 20 Mar 2003
C57.13.6	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS FOR USE WITH ELECTRONIC REVENUE METERS AND RELAYS	TEN-HAAGEN C. (603)749-8433	PSIM PSR TD	2/13/03	Par approved Feb 13, 2003

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	6/27/91 Balloting 12/10/96 PAR Extended until 12/04 2002	
C57.106	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF INSULATING OIL IN EQUIPMENT	Thompson, J. 919-580-3247	NONE	6/12/02 12/10/02 2007	
C57.111	GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENANCE IN TRANSFORMERS	J. Goudie (517)496-6826	IAS T&D ED&PG	2/2/89 NEED Reaffirmation or Revision 12/10/87 2001	Standard Extended until 12/04
C57.121	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF LESS FLAMMABLE HYDROCARBON FLUID IN TRANSFORMERS	McSHANE C. P. (617)926-4900	PSRC 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	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	Ladroga, R.	IEC US TA	12/10/02	New PAR approved
IEEE 637	GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE	J. Thompson (605) 534-3571		6/4/84 2007	reaffirmed 12-10-02
IEEE1258	TRIAL-USE GUIDE FOR INTERPRETATION OF GASES GENERATED IN SILICONE-IMMERSED TRANSFORMERS	Goudie/Bartley (517) 496-6826	T&D ICC	6/15/95. 0	

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. PLATTS					
PHONE:					
GUIDE FOR DEFINITION OF THERMAL DUPLICATION BEASTER B.					
1538	GUIDE FOR DETERMINATION OF MAXIMUM WINDING TEMPERATURE RISE IN LIQUID FILLED TRANSFORMERS	PLATTS, D.		6/1/00	Approved as new standard
C57.100	TEST PROCEDURE FOR THERMAL EVALUATION OF OIL-IMMERSED DISTRIBUTION TRANSFORMERS	Wicks, R. (804) 383-3300	PE/PSR IA/PSE PE/T&D	6/26/99	Applying for new Par 2005
C57.119	RECOMMENDED PRACTICE FOR PERFORMING TEMP. RISE TESTS ON OIL-IMMERSED POWER TRANSFORMER AT LOADS BEYOND NP RATING	S. Tuli 262-547-0121	SWGR SUBS SCC4	10/10/01 5/16/00	Approved New Recommended Practice
C57.91	GUIDE FOR LOADING MINERAL OIL-IMMERSED TRANSFORMERS	RAYMOND T. (518) 884-0297	SUB T&D PSE	6/14/95 3/24/00	Corriagenda Approved Dec 10, 2002 Reaffirm disapproved. 2-year extension granted
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	Balloting Reaffirmation Extended until 12/2003
NONE				2002	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: PERFORMANCE CHARACTERISTICS					
CHAIR:	R. GIRGIS				
PHONE:	(314)679-4803				
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	PSR	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 PSR NEMA	7/2/98	
NONE				2003	
C57.123	GUIDE FOR TRANSFORMER LOSS MEASUREMENT	GIRGIS, R. (765)286-9532		6/12/02	Approved as new standard 6/12/02
PC57.123				9/16/99	
				2007	
C57.133	GUIDE FOR SHORT-CIRCUIT TESTING OF DISTRIBUTION AND POWER TRANSFORMERS	McQUIN N. (412) 829-1205	T&D, SWG PSR IECTC14	9/21/95	PAR withdrawn Mar 2003 Need new PAR Balloting complete, awaiting publishing
C57.142	A guide to describe the Occurance and Mitigation of Switching Transients Induced by Transformer/Breaker interaction	DEGENEVEFF, R. 518-276-6367	SUBS IAS/PSE IAS/REP	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 CODE FOR SHUNT REACTORS RATED OVER 500kVA	Balma P.	EM T&D PSR	4/2/91	Balloting Reaffirmation
NONE				2001	
IEEE 638	QUALIFICATION OF CLASS 1E TR FOR NUCLEAR POWER GENERATING STATIONS	PIERCE L. W. (706)291-3166	NPE SUB SC2	3/19/92	REAFFIRMED 1999
P638				10/29/90	
				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: HAGER/LUNDQUIST					
PHONE:					
PC57.143	Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Components	A. Lux/D. Chu 919-856-3888		3/21/02	
C57.116 NONE	GUIDE FOR TRANSFORMERS DIRECTLY CONNECTED TO GENERATORS	REITTER G. (415)508-2850		1/3/89 Reaffirmed 6/2000 2005	
C57.117 NONE	GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS	CASH D. (702) 227-2316		6/17/92 REAFFIRMED 1998 2003	
C57.12.10 None	TRANSFORMERS 230kV AND BELOW - 8333/10417kVA 1 PH. -100000 kVA 3 PH w/o LTC, 100000kVA w/ LTC - SAFETY REQUIREMENTS	Javiar Arteaga (312)394-2704		6/4/87 6/13/02 Coordinate with C57.12.36 1993	
C57.120 NONE	LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS	JACOBSEN R.	SUB IAS EM IEC ED&PG	12/29/00 Reaffirmed 12/29/00 5/1/80 2005	
C57.125 NONE	GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION AND ANALYSIS FOR POWER TRANSFORMERS AND SHUNT REACTORS	CASH D. (702) 227-2316	T&D SWGR ED&PG PSE	6/27/91 REAFFIRMED 1998 6/28/87 2003	
C57.131 NONE	REQUIREMENTS FOR LOAD TAP CHANGERS	Henning, W.		3/16/95 Reaffirmation ballot underway 2001	Extended until 12/2003
C57.135	GUIDE FOR APPLICATION, TESTING, INSTALLATION AND OPERATION OF PHASE ANGLE SHIFTING TRANSFORMERS	TRUMMER /Lundqu 43-3172-606-404	PSRC IEC TC14 EMC	12/5/01 Standard approved 12/5/01	
C57.140 PC57.140	Evaluation and Reconditioning of Liquid Immersed Power Transformers	JAMES, R. (504)576-6246	IAS/PSP	2006	PAR extended until Dec 2005 9/16/99
C57.141 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	PUBDATE PARDATE REV DUE	STATUS AND COMMENTS
C57.17 ANSI	REQUIREMENTS FOR ARC FURNACE TRANSFORMERS	CORSI D. 330-875-3333		12/12/95 6/13/02 2006	STANDARD HAS BEEN WITHDRAWN *TF has been established, No PAR. submitted
C57.93 PC57.93	GUIDE FOR INSTALLATION OF LIQUID-IMMERSED POWER TRANSFORMERS.	LAU M. (604)528-3201	NONE		
SUBCOMMITTEE: Standards					
CHAIR: T.A. PREVOST					
PHONE:					
PC57.144	Guide to Metric conversion of Transformer Standards	Galloway, D. (573)635-7587		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	Reviewing ballot comments
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-V 24940 grdV/14400 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 <, HV 24940 grdV/14400 OR <, 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	TERMINOLOGY FOR POWER & DISTRIBUTION TRANSFORMERS	TRAUB T. P. (312)394-2704	T&D SUBS	5/1/92 6/14/95 2002	
C57.12.90 None	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF ...			6/26/99 6/15/95 2004	Resolving comments and negatives from latest

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE 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,34500GrY..& BELOW,LV,480 V AND BELOW	SULLIVAN J. (813) 228-4111	T&D IAS/PSEC IC IEC TC 14 IAS/REPC	3/17/94 1999	Need new PAR
C57.12.40	REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMERSED)	Klaponski,B. (204) 633-7220	T&D IAS/PSEC ICC IEC TC14 IAS/REPC NEMA	2/1/02 1998	PARApproved feb. 2002
C57.12.44	STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS	MULKEY D. H. (415)973-4699	T&D IAS/PSEC SWGR BEI IAS/REPC NEMA	8/1/00 2005	Revised Standard approved 8/2000
C57.12.57	REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500KVA AND BELOW; W/HV 34500V AND BELOW,LV 216Y..AND	ROBINSON, A.	T&D BEI/T&D SCC14	3/18/92 12/5/91 2000	Need new PAR to establish standard

NOTE: Van., OKC, and Ral. info. not yet factored into MAX or AVG figures. Check Committee website for future update.

GROUPS	Monterre Nov. 99	Nash TN Apr. 00	Niagara Oct 00	Amster Apr01	Orlando Oct 01	Van R C Apr02	OKC OK Oct 02	Ral NC Mar 03	MAX	AVG
Committee Registration: Members and Guests	275	302	361	265	280	280	280	332	361	285
Snouces	35	94	94	67	60	81	81	41	94	63
Luncheon	216	175	217	131	140	161	176	207	262	196
SC ADMINISTRATIVE	23	23	22	18	24	23	20	19	24	21
NEWCOMERS ORIENTATION							30	20		
SC Meeting and Planning				15	17	22	18	14	15	15
SC AUDIBLE NOISE AND VIBRATION	31	21	21	17	27	25	17	21	32	25
WG Sound measurements						23	19	18		
WG Transformer siting guide C57.136										
SC BUSHINGS	27	28	28	28	29	42	44	46	32	26
WG Revision C57.19.00	23	25	38	25	27	36	29	-	38	28
TF Draw Lead Bushings	16	24	27	18	13				27	21
WG Revision C57.19.01	22	19							38	27
SC DIELECTRIC TESTS	68	91	96	62	87	93	117	124	96	77
WG Revision to Low Frequency Tests	54	48		34	48	40		50	54	41
WG Revision of Transient Dielectric Tests	35	43	37			38	40	34	43	34
TF Rev. to Impulse Tests					19	41	27	46-WG	19	19
TF L.F. Transformers Dielectric Test Table	37		46	60	45	46		54	46	43
WG Partial Discharge Tests	66	47	66	65	44	41	86	74	66	55
SC DISTRIBUTION TRANSFORMERS	34	53	41		50	45	40	47	53	42
WG Dist. Substation Transformers C57.12.36		40	37		32	22	28	30	40	29
WG Overhead Type Distr. Transfs. C57.12.20	28	49	39		40	36	32	32	49	36
WG Single-Phase Submersible C57.12.23	10	20	18					-	41	21
WG Single-Phase Deadfront Padmount C57.12.25		47			33	35	27	40	47	38
WG Bar Coding								-	40	40
WG Loss Evaluation C57.12.33		45			49	41	48	35	49	47
WG Electronic Data Transmittal		22			17	16	26	21	22	17
WG Three-Phase Padmount C57.12.34		42			33	40	36	38	42	33
WG Step-Voltage and Induction Regs C57.15					26	26	18		26	17
SC DRV-TYPE TRANSFORMERS	25	25	31	20	20	21	20	27	33	25
WG Test Code C57.91	18	11	24	12	10	13	12	24	23	18
WG Drv-Type Reactors	9	10	11	13	7	10	10	9-TF	13	10
WG Drv-Type Thermal Eval. And Flammability										
WG Drv-Type General Requirements C57.12.01	26	23	23	14	25	20		18	28	23
WG Drv-Type Thru Fault Current C57.12.59		15	16						16	16

NOTE: Van., OKC, and Ral. info. not yet factored into MAX or AVG figures. Check Committee website for future update.

GROUPS	Monterre Nov. 99	Nash TN Apr. 00	Niagara Oct. 01	Amster Apr01	Orlando Oct. 01	Van. B.C. Apr02	OKC OK Oct 02	Ral NC Mar 03	MAX	AVG
SC HVDC CONVERTER TRANSF & REACTORS	13	7	19	15	7	13	14	13	19	10
IEC TC 14 TAG			37	30	14	27	12	20	37	27
SC INSTRUMENT TRANSFORMERS	10	10	17			15	16	18	13	11
WG C57.13.5 Test Req Instr Transf >115 kVA	13	10	13	13	16	12		23	20	14
WG C57.13.6 Instr Transf for Electronic Meters & Relays	20	11				11	13	14	20	16
WG Revision of C57.13			10	10		9	12	18	17	11
SC INSULATING FLUIDS	68	75	66		70	33	39	40	84	70
SC INSULATION LIFE	56	51	66	30	109	90	84	107	109	64
WG Loading Lin. Transformer	108		58		76	86			108	81
WG Revision of Temperature Test Code	29							-	29	26
WG Thermal Duplicate	40	27		30	26			41	40	31
TF Winding Temperature Indicators	25	27	28		23	22	23	23	32	25
TF On Temperature Rise Clause 5, C57.12.00					27	34	25	-	27	27
SC PERFORMANCE CHARACTERISTICS	58	69	82	81	102	110	115	129	102	71
WG Loss Tolerance and Measurement	29	33	37	29	31	29	24	36	37	30
WG PCS Rev. C57.12.00	65	49	70	37	63	51	53	69	75	57
WG PCS Rev. C57.12.90		42	65	34	44	76	91	65	65	41
TF Joint/PSIM low of measurement						22	50	34		
WG Switching Transients	0	52	49	39	50	45	60	94	52	42
WG DETC specifications and tests	50	49	40		3	62		44-PT	50	43
SC POWER TRANSFORMERS	59	66	109	80	116	112	110	113	116	65
WG ITC Performance	30	24	21	29	24	40	44	50	31	27
WG C57.140 Transformer Life Extension	46	62	48	35	66	66	72	100	66	48
WG Monitoring of Liquid Immersed Transformers	54		55	70			82	56	70	54
TF Control Cabinet Guidelines					49	29	42	36	49	49
WG Revision of C57.12.10		37	30	27	34	28	40	33	37	32
WG West Coast						20	11	10	13	13
WG Installation of Liquid Filled Transformers, C57.93				39		57	59	35	39	39
WG Phase Shifting Transformers C57.137	34	26	45	25					45	33
SC STANDARDS	23	38		32	47	30			47	23
Standards Development Practice Review								~50	8	
SC UNDERGRND TRANSF & NETWK PROTCS	21	26	18	3	13	14	13	15	26	16
WG Three-Phase Underground Transfs. C57.12.24	14	27	15	4	9			15	27	14
WG Liquid-Filled Sec. Network Transfs. C57.12.40	15	16	15		14	14	15	18	17	16
WG Secondary Network Protectors C57.12.44	12	10	14		10	8	8	11	14	11
WG Dry-Type Network Transfs. C57.12.57	10	10	15		9		7	-	15	9

Note: Data maintained for four years only