

IEEE/PES
Transformers
Committee

Meeting Minutes
October 24, 2002

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

October 24, 2002

Oklahoma City, Oklahoma, USA

IEEE/PES TRANSFORMERS COMMITTEE MEETING

Oklahoma City, Oklahoma. USA

October 20-24, 2002

ATTENDANCE SUMMARY

MEMBERS ATTENDING, AND PRESENT FOR MAIN MEETING (10/24)

Andersen, Glenn	Galloway, Dudley	Lau, Mike	Progar, John
Anderson, Greg	Ghafourian, Ali	Lindgren, Stan	Puri, Jeewan
Arnold, Jr., Jim	Girgis, Ramsis	Lowe, Don	Robinson, Butch
Barker, Ron	Griesacker, Bill	Lundquist, Tom	Romano, Ken
Barnard, Dave	Grunert, Bob	Marek, Rick	Sharma, Devki
Bartley, Bill	Gryzkiewicz, Frank	Marlow, Dennis	Sim, Jin
Binder, Jr., Wally	Haas, Michael	Matthews, John	Smith, Ed
Boettger, Bill	Hager, Jr., Red	McClure, Phil	Smith, Jim
Borst, John	Haggerty, N. Kent	McTaggart, Ross	Snyder, Steven
Cambre, Jr., Max	Hanique, Ernst	Morehart, Gene	Stahara, Ron
Chiu, Bill	Harlow, Jim	Nicholas, Ray	Stensland, Len
Colopy, Craig	Hartgrove, Bob	Niemann, Carl	Stiegemeier, Craig
Corkran, Jerry	Hayes, Roger	Orehek, Paul	Thompson, James
Crouse, John	Henry III, George	Patel, Bipin	Thompson, Robert
Daubert, Ron	Hopkinson, Phil	Patton, Jesse	Traub, Tom
Dix, Larry	James, Rowland	Payne, Paulette	Tuli, Subhash
Duckett, Don	Jonnatti, Tony	Pekarek, Tom	Wagenaar, Loren
Dudley, Richard	Kennedy, Sheldon	Perco, Dan	Ward, Barry
Elliott, Fred	Khalin, Vladimir	Plaster, Leon	Watson, Joe
Ellis, Keith	Kline, Don	Platts, Don	Whearty, Bob
Fallon, Don	Lackey, John	Poulin, Bertrand	Zhao, Peter
Foldi, Joe	Ladroga, Rick	Preininger, Gustav	

MEMBERS ATTENDING, BUT NOT PRESENT FOR MAIN MEETING (10/24)

Aho, David	Fyvie, Jim	Ma, Joe	Savio, Leo
Antosz, Stephen	Gardner, James	Molden, Arthur	Wilks, Alan
Arteaga, Javier	Gaytan, Carlos	Prevost, Tom	
Balma, Peter	Harley, Jack	Riffon, Pierre	
Fleeman, Jeff	Henning, Bill	Rossetti, John	

MEMBERS ABSENT

Allan, Dennis	Bonucchi, Joe	Dohnal, Dieter	Hall, Geoff
Allustiarti, Raymond	Brown, Charles	Easley, John	Hansen, Wayne
Altman, Mike	Carter, Bill	Ebert, John	Hanus, Ken
Atout, Khaled	Cash, Don	Feghali, Pierre	Heinrichs, Frank
Aubin, Jacques	Chu, Don	Foster, Sam	Highton, Keith R.
Ayers, Don	Clark, Tom	Franchek, Mike	Hoefler, Pete
Bancroft, Roy	Compton, Olin	Frank, P.E., Jerry	Huddleston III, Jim
Barnes, Mike	Dahinden, Vincenz	Gillies, Jim	Iman, Mike
Bertolini, Edward	Degeneff, Bob	Graham, Richard	Jhonsa, VJ
Blackburn III, Gene	Diamantis, Tom	Grubb, Bob	Johnson, David

Johnson, Jr., Chuck	Massouda, Tito	Patterson, Jr., Wes	Singh, Prit
Juhlin, Lars-Erik	McGill, Jack	Pearce, Henry	Smith, Ray
Kallaur, Gene	McNelly, Susan	Perkins, Mark	Smith, Jerry
Kappeler, Cal	McQuin, Nigel	Pierce, Lin	Stein, Werner
Kelly, Joe	McShane, Patrick	Purohit, Dilip	Stewart, Peter
Kennedy, Bill	Mehta, Sam	Raymond, Charlie	Stoner, Ron
Kim, Dong	Miller, Kent	Risse, Peter	Sullivan, John
Koenig, E.	Millward, Paul	Robbins, Chris	Templeton, Jim
Lazar, John	Mitelman, Mike	Ruevekamp, Henk	Thomas, Ray
Lewis, Frank	Moore, Harold	Sampat, Mahesh	Trummer, Edgar
Lewis, Tim	Mulkey, Daniel	Sankar, V.S.N.	Vaillancourt, Georges
Light, Hal	Murray, Chuck	Scheu, Bob	Veitch, Bob
Long, Leonard	Musil, R.J.	Schweiger, Ewald	Weffer, Felipe
Lowdermilk, Larry	Mutschler, Jr., Bill	Shenoy, Vic	Wimmer, Bill
Lowe, Richard	Norton, Ed	Shertukde, Hemchandra	Woodcock, David
MacMillan, Donald	Paiva, Gerry	Shteyh, Ibrahim	
Maguire, William	Papp, Klaus	Shull, Stephen	

GUESTS ATTENDING, AND PRESENT FOR MAIN MEETING (10/24)

Aguirre, Samuel	Darwin, Alan	Hughes, Bert	Paik, Henry
Ahuja, Rajendra	De La Houssaye, Kevin	Jarman, Paul	Patni, Prem
Amos, Richard	Diem, Arthur	Jarozewski, Marion	Rave, Martin
Anderegg, Don	Drexler, Charles	Jauch, Tom	Raymond, Tim
Antweiler, Jim	Fairris, Bruce	Kalra, C.J.	Rensi, Randy
Arpino, Carlo	Ferreira, Marcos	Keithly, Dave	Riboud, Jean-Christophe
Ashley, Joe	Field, Norman	Klaponski, Brian	Roussell, Marnie
Bassett, Tom	Forrest, Alan	Ko, Chung-Duck	Schroeder, Stephen
Bello, Oscar	Forsyth, Bruce	Kranich, Neil	Shaver, Lenny
Boman, Paul	Garza, Joseph	Leuenberger, Boyd	Speegle, Andy
Brettschneider, Stephan	Gianakouros, Harry	Martinez, Al	Spitzer, Tommy
Bush, Carl	Goodwin, Dave	Matthews, Lee	Steineman, Andy
Bustamante, Tony	Gruber, Myron	McBride, James	Taylor, Robyn
Callsen, Thomas	Hammers, Jack	Melanson, Joseph	Tennent, Jeffrey
Castellanos, Juan	Haufler, John	Nguyen, Vuong	Tuohy, John
Christini, Mark	Hayman, Brent	Nguyen, Van Nhi	Von Gemmingen, Rich
Coffeen, Larry	Heinzig, Peter	Nols, Ernest	Washington, Anthony
Cooper, Tommy	Hochanh, Thang	Nunez, Arturo	Wicks, Roger
Darovny, Bill	Huff, Tim	Olen, Robert	Ziomek, Waldemar

GUESTS ATTENDING, BUT NOT PRESENT FOR MAIN MEETING (10/24)

An, Sokom	Blake, Dennis	Caruso, Charles	Foster, Derek
Baranowski, Derek	Bosiger, John	Choinski, Scott	Fridman, Harry
Barnett, Darren	Boss, Pierre	Comely, Tracy	Ganser, Robert
Bartek, Al	Bouza, Antonio	Corsi, Dom	Garnitschnig, Andreas
Basu, Bikash	Bray, Frank	Costa, Florian	Gibson, Wayne
Baur, Martin	Brender, David	Culhane, Michael	Gillespie, Eugene
Berger, Philip	Britton, Jeffrey	D'Amico, Frank	Gomez Ibarra, Rolando
Berler, Zalya	Brush, Edwin	Davis, Larry	Goudie, Jim
Betancourt, Enrique	Bustamante, Jose Luis	Davydov, Valery	Graifer, Alexander
Bittner, Carlos	Carlos, Arnaldo	Fischer, Paul	Haas, Mark

Hanson, Dave
Holifield, Thomas
Hollingsworth, Rich
Jafarnia, Mostafa
Jakob, Karl
Jakob, Fredi
Jenkins, Beverly
Jostrand, Patrick
Kendrick, David
Kennedy, Gael
Kirker, Ron
Kostyal, Stanley
Krump, Reiner
Kurth, Bernhard
Lu, Franklin
Luby, Thomas

Machado, Jr., Tamyres
Magee, Tommy
McGrail, Anthony
Mehl, Donald
Mitchell, Michael
Moffat, Jock
Monoski, Chris
Nelson, Tom
Nicholas, Ron
Olson, Tim
Oommen, T.V.
Oriti, Samuel
Patel, Dhuru
Peterson, Alan
Pink, Tony
Potter, Marlin

Rahangdale, Ravi
Rahmatian, Farnoosh
Rajadhyaksha, Mangesh
Ray, Jeffrey
Reed, Scott
Reitter, George
Rivers, Mark
Roizman, Oleg
Runske, John
Sandhu, Surinder
Schappell, Steven
Schneider, Jeff
Shekelton, Jim
Shekelton, Jay
Shertukde, Rekha
Silvestre, Manuel

So, Eddy
Sousa, Joao Paulo
Still, Robert
Sweetser, Charles
Swift, Glenn
Swinderman, Craig
Ten Haagen, Chris
TeNyenhuis, Ed
Thaden, Malcolm
Toda, Katsutoshi
Villasenor, Alejandro
Von Holle, Anthony
Walters, Shelby
Wiegand, David
Zarmandily, Hassan

Table of Contents

CLAUSE	PAGE
1.0	Chairs’s Report, Remarks & Announcements – H. J. Sim 1
1.1	Report on the Technical Council Meeting, July 23, 2002 3
1.2	Transformers Committee Report to Technical Council 5
1.3	IEEE/NEMA MOU issue 8
2.0	Approval of Minutes of April 18, 2002 – H. Jin Sim 8
3.0	Administrative Subcommittee – H. Jin Sim 8
3.1	Introduction of members and guests 8
3.2	Approval of the Oklahoma City AdCom meeting minutes 9
3.3	Additions to and/or approval of the agenda 9
3.4	Meeting arrangements, host reports, and committee finances – G.W. Anderson 9
3.5	ASC C57 ISSUES – H. J. Sim 10
3.6	IEEE delegation report ANSI C57 Committee – B. K. Patel 15
3.7	Committee Service Awards – B. K. Patel 16
3.8	Chair’s report – H. J. Sim 17
3.9	Vice Chair’s report – K. S. Hanus 17
3.10	Secretary’s report – D. J. Fallon 17
3.11	EEE Standards Activities – Naeem Ahmad 19
3.12	Standards Subcommittee - T. A. Prevost 19
3.13	Subcommittee Activities - Subcommittee Chairs 20
3.14	Old Business 22
3.15	New Business 23
3.16	Adjournment 24
4.0	Editor’s Report – M. Christini 26
5.0	Vice Chair’s Report – K. S. Hanus 32
5.1	PES Technical Council Committees 32
5.2	Technical Paper Reviews 35
6.0	Transformer Standards - T. A. Prevost 36
6.1	Chairs Remarks: 36
6.2	Reports of WG’s: 37
6.3	New Business 37
6.4	Standards Activities Since the April, 2002 Meeting 37
7.0	Recognition and awards – B. K. Patel 49
7.1	Certificates of Appreciation 49
7.2	Nominations for IEEE, PES, and Technical Council Awards 49
7.3	Awards – General 50
8.0	Meetings Planning Subcommittee -- G. W. Anderson 52
8.1	Committee Finances 52

8.2	Past & Present Meetings	52
8.3	Future Meetings	53
8.4	Working Group Report	54
8.5	New Business	55
8.6	Miscellaneous.....	57
9.0	Reports of Technical Subcommittees.....	59
9.1	HVDC Converter Transformers & Smoothing Reactors SC – R. F. Dudley, Chair	59
9.2	Instrument Transformers SC – Jim Smith, Chair	60
9.3	Insulating Fluids SC – F. J. Gryszkiewicz, R. K. Ladroga, Co-Chairs.....	63
9.4	Insulation Life SC – D. W. Platts, Chair	65
9.5	Performance Characteristics SC – R. S. Girgis, Chair.....	71
9.6	Power Transformers – E. G. Hager, T. Lundquist, Co-Chairs.....	82
9.7	Underground Transformers & Network Protectors SC – C. G. Niemann, Chair	90
9.8	Audible Sound and Vibration SC – Jeewan Puri, Chair	94
9.9	Bushings SC – Fred Elliott, Chair.....	95
9.10	Dry Type Transformers SC – W. F. Patterson, Jr., C. W. Johnson, Jr., Co-Chairs.....	99
9.11	Distribution Transformers SC – Ed Smith, Chair.....	103
9.12	Dielectric Tests SC – Loren Wagenaar, Chair	115
10.0	Reports of Liaison Representatives	123
10.1	EPRI – B. Ward	123
10.2	SCC4 - P. A. Payne	127
10.3	TC 14 TAG - P. J. Hopkinson	128
10.4	CIGRE – Jean-Christophe Riboud.....	130
11.0	Old Business.....	131
12.0	New Business	131
13.0	Adjournment	131
	Attachment 1 – Status Report of Standards of IEEE/PES Transformers Committee.....	132
	Attachment 2 – Coordination Activities of the IEEE/PES Transformers Committee.....	145
	Attachment 3 – Meeting Room Attendance Record.....	146

IEEE PES TRANSFORMERS COMMITTEE MEETING

Thursday, October 24, 2002

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

Secretary: D. J. Fallon

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

Chairman Jin Sim called the meeting to order at 8:00 A.M. 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.

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. Termination of this MOU also has impact on the IEEE/NEMA MOU for joint copyright of several standards documents maintained by our Committee, and results in a need for review and recommendations on appropriate processes for development of those standards. See Section 3.5 for more complete details.
- IEEE and IEC have agreed to consideration of use of dual logos (IEEE and IEC) in publication, in cases where a document developed by one organization has no counterpart in the other. In review at the Administrative SC meeting, Jin mentioned that we are considering submittal of documents from the Insulation Life SC and the HVDC Converter Transformers and Smoothing Reactors SC for review for possible dual logo publication. Documents Candidates for consideration should be submitted through our Standards Coordinator, Tom Prevost. One concern is that assurance is needed that the review and approval process for dual logo publication should not delay document publication; IEEE indicates they will work to address this concern.
- New Committee Members approved at the Administrative SC Meeting on 10/20/02 were announced to the group and welcomed to full Membership. These include:
 - 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 prior membership)

- The Administrative SC also voted on 10/20 to elevate Bill Kennedy's status to Emeritus Membership, in recognition of his contributions to the industry.
- Chairman Sim also noted the recent passing of one of our pre-eminent Members, Chuck McMillen. Phil Hopkinson stepped forward to provide some comments highlighting Chuck's legacy as a scholar, mentor, and friend, and his active leadership in distribution transformer activities within the Committee. The Committee recognizes Chuck's contributions and regrets his passing.
- Discussion continues on the advisability and need of printing of Committee Minutes, as opposed to having them mainly available on the Committee website. Alternatives under consideration include (1) Printing only for individuals who request printed copies, and charging an appropriate fee for printing and distribution; and (2) Not printing at all. The Chair asked for discussion. Comment items included:
 - Availability in CD format
 - Requirement to make Minutes available to all Members, even those not in attendance at the Meeting
 - Process for identifying print by request needs, including process for notifying members not in attendance.
 - Members without access to internet or e-mail

Several motions were raised, discussed, and modified. At the conclusion of discussion, a motion was forwarded by John Borst, including modification suggested by Rowland James. Tom Lundquist seconded the motion.

Motion: The Transformers Committee will dispense with general printing of the Committee Meeting Minutes, in favor of availability on the Committee website, while maintaining the option for printing at appropriate cost for individuals upon request (requests to be submitted either at or shortly after each Meeting).

The Chair called a vote, with a reminder that only Committee members should vote. The results of the vote were: 78 Approved, 7 Not Approved, 0 Abstentions. The motion was approved, but the Secretary noted that the vote did not represent a quorum. The Chair initially directed that the Secretary review further and consider conducting an e-mail/letter ballot. The Secretary will review the O&P Manual to determine whether the Administrative SC, and the officers have the authority to make a ruling based on this consensus vote. If not, an e-mail/letter ballot will be considered.

- Concern for the content of the Thursday Main Committee Meeting was raised again at the Administrative SC meeting. All members are encouraged to provide their suggestions on improvements to the present Thursday Main Meeting format or content, in order to enhance the overall value of the Meeting, and this session in particular, for all attendees.

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

1.1 Report on the Technical Council Meeting, July 23, 2002

Attendance for the Summer Meeting stood at 1838 at the time of the Technical Council Meeting.

1.1.1 Chair's Report

The following is a highlight of the report:

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.

Accredited Standards Committees

John Estey gave a summary of the status of the above committees and reported on a meeting held on July 12, where industry representatives discussed future actions required. More on this subject later.

IEEE/IEC Dual Logo Standards

Terry deCourcelle reported that an interim agreement has been reached with IEC to publish dual logo standards (with IEEE and IEC logos on the cover).

Candidates consisting of IEEE standards that have no parallel work in IEC are being sought for submission.

1.1.2 Technical Council Chair Jim Harlow reported the following

IEEE Product Safety Committee

Technical committees with a product orientation may find that a new IEEE level committee, Product Safety, will provide a useful adjunct to their operations. This committee will address product safety as a discipline. It is first targeted to the several thousand product safety professionals who focus on product safety, not particularly as part of any power equipment or other specific hardware. The goal of this committee is to create a group to stimulate discussion and focus on product safety as well as be a support group and link to product safety activities within other Societies. Those wishing additional information should contact Daniece Carpenter <Daniece_Carpenter @Dell.com>

IEEE Membership Restrictions

A spate of email communications followed my distribution of a message stating IEEE's lawyers have concluded that, as a US corporation, IEEE cannot do business with countries (or their citizens) which are on an official US sanction list. We are now advised that cool heads have prevailed, much of the original message is voided, and work is being done to develop a reasonable policy. This will be communicated as more becomes available.

IEEE Security & Privacy Magazine

The Computer Society has a new magazine *IEEE Security and Privacy Magazine*. The focus is on computers but, as has been observed many times in the elimination of *CAP*, it is getting difficult to tell what a computer is anymore since computing power is built into so much of everything we do. PES members with this interest should consider participating in this magazine as by submitting articles. It may be we (PES) should have a representative on the editorial board. Please let me know if someone in your committee should be considered for this.

ANSI Accredited Standards Committees

The IEEE-SA is withdrawing from the Memorandum of Understanding which established IEEE and NEMA as co-secretariats of the ANSI Accredited Standards Committees C37 (Switchgear), C57 (Transformers), C62 (Surge Protective Devices). This has numerous implications for the writing of standards by those committees.

PES President John Estey chaired a meeting in Washington on July 12 which was attended by 25 leaders of manufacturers, electric utilities, industrial companies, NEMA and IEEE. This group defined a preferred process for the administration of the standards activities; the matter now moves to how to transition to that process from the organizational structures that exist today. ANSI has agreed not to take any action at this time with regard to the standards in these three areas and to continue business as usual until we reach a resolution.

Stationary Battery Committee and SCC-29

The ongoing work of various battery related standards is currently conducted in SCC-29. A Standards Coordinating Committee is restricted in its activities to the writing of standards and can not participate in other functions such as a PES Technical Committee routinely enjoys. There is at this time a ballot in process to dissolve SCC-29 and move all of the battery standards work into the auspices of the PES Stationary Battery Committee.

Respectfully submitted,

James H. Harlow VP, Technical Activities

1.1.3 Other Related Activities

Policy Development Coordinating Committee (PDCC)

Some very timely and interesting issues on the Generation and Transmission industry trend were presented by Doug Logan. If you would like to receive a copy of Doug's presentation, write a request to me at jin.sim@ieee.org.

Emerging Technology Coordinating Committee (ETCC)

This group compiled many emerging technologies into the "First Annual Report – July 2002". If you would like to receive a copy of this annual report, write a request to me at jin.sim@ieee.org.

1.2 Transformers Committee Report to Technical Council

The following is my report to Technical Council for the Committee:

Committee Meeting Activities

Our Spring 2002 meeting was held April 14-18, 2002 in Vancouver, BC, Canada. Mr. Mike Lau of BC Hydro was our host. 280 members and guests (and 81 companions) attended the meeting.

Generally, the Committee meets twice a year - in the fall and spring (usually during the last two weeks of March or first two weeks of April; and the last two weeks of October or first two weeks of November). Our meetings are 4-1/2 days in duration that begins generally on Sunday afternoon and runs through noon on Thursday.

During the Spring 2002 meeting, we had two significant issues of general interest. The termination of the Memorandum of Understanding between IEEE and NEMA as a co-secretariat of ASC C37, C57, and C62 effective June 10, 2002 concerned many members of our Committee working on those documents jointly copyrighted by both IEEE and NEMA. The members of these Working Groups and ASC C57 Main Committee want to maintain good working relationships and are currently proceeding with "business as usual" in following the standards development process of the IEEE, with IEEE-SA PAR's in place to provide members with appropriate indemnification. Members are concerned that the final outcome of this termination may negatively impact the work in process as well as future development of the necessary standards for the industry. The other issue is the great concern that the IEEE metrification policy as applied to product standards may cause certain safety problems. We have many "product standards" that deal with specific weights and dimensions. When these documents are converted to all metric units, there are significant possibilities that these units can be misinterpreted causing safety issues. We are working through the appropriate IEEE-SA organizations to address these issues.

Membership of the Transformers Committee currently stands at 188 members and 18 emeritus members. The regular members consist of 93 producers, 51 users, and 44 general interest. We also have one life member and one corresponding member. Our invitation list consists of approximately 500 engineers and managers in the transformer and utility industry. Attendance at our semi-annual meetings is typically near 350. Anyone with an interest in furthering the technology is welcome at our meetings. With active participation, an invitation is extended to become a member.

The Committee goals are to encourage open participation in transnationalization of transformer

standards; to promote technical and educational endeavors such as panel sessions, technical presentations, peer review of technical literature on related subjects; and to support the efforts of the Power Engineering Society. In an effort of meeting one of the major goals of PES to attract more participation, the Committee has committed itself to arrange at least two technical presentations/tutorials of educational nature at each meeting. At the last meeting, we held four technical presentations/tutorials and provided PDH for those who applied. The participation and acceptance of these four events "exceeded our expectations". Most of the presentation material is available from the Committee website (<http://www.transformerscommittee.org>).

Future Meetings

Fall 2002:

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

Spring 2003:

April 16-20, 2003, Sheraton Capital Center, Raleigh, NC, USA. Contact Ray Nicholas, Host @ ABB Power T&D Company (804) 575-2133, ray.nicholas@us.abb.com, or one of the Committee Officers.

Committee Officers

Chair

H. Jin Sim
Waukesha Electric Systems
P.O. Box 268
Goldsboro, NC 27530, USA

Phone: + (919) 580-3234
Fax: + (919) 580-3237
E-Mail: Jin.Sim@ieee.org

Vice Chair

Ken. S. Hanus
Oncor Energy Delivery
P. O. Box 970
Fort Worth, TX 76101, USA

Phone: + (817) 215-6020
Fax: + (817) 215-6873
E-Mail: Ken.Hanus@ieee.org

Secretary

Don Fallon
PSE&G
80 Park Plaza T14A
Newark, NJ 07101-0570

Phone: + (973) 430-8191
Fax: + (973) 624-0926
E-Mail: donald.fallon@ieee.org

Standards Coordinator

Thomas A. Prevost
EHV Weidmann Industries

Phone: + (802) 751-3458
Fax: + (802) 748-8029

One Gordon Mills Way
St. Johnsbury, VT 05819, USA

E-Mail: tprevost@ieee.org

Subcommittees

Audible Sound and Vibration Subcommittee, J. Puri, Chair
Bushing Subcommittee, F. E. Elliott, Chair
Dielectric Tests Subcommittee, L. B. Wagenaar, Chair
Distribution Transformers Subcommittee, J. E. Smith, Chair
Dry-Type Subcommittee, W. F. Patterson, Chair
HVDC Converter Transformers and Smoothing Reactors Subcommittee, R. F. Dudley
Insulating Fluids Subcommittee, F. J. Gryzkiewicz, Chair
Insulation Life Subcommittee, D.W. Platts, Chair
Instrument Transformers Subcommittee, J. E. Smith, Chair
Meetings Planning Subcommittee, G. W. Anderson, Chair
Performance Characteristics Subcommittee, R. S. Girgis, Chair
Power Transformers Subcommittee, E. G. Hager, Jr., Chair
Standards Subcommittee, T. A. Prevost, Chair
Underground Transformers and Network Protectors Subcommittee, C.G.Niemann, Chair

2002 Summer Meeting Technical Sessions

The Transformers Committee is sponsoring two presentation sessions on transformers during the Summer Meeting.

Transformer Standards and Coordination Activities

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

<http://www.transformerscommittee.org>

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

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

H. Jin Sim, Chair

1.3 IEEE/NEMA MOU issue

All the background information can be found from the Committee website and also from my report for Transformers Committee. There were two "Industry Executives" meetings to resolve this issue during 2002. Current position of the Transformers Committee is that we are conducting our business as normal, following the IEEE-SA procedures. We do want to resolve this issue so that the limited resources we got can focus on technical work. IEEE's next step on this issue are:

- Recommend assigning a Task Force to work with IEEE staff to develop what's needed for Industry Executive Group
- Get input from NEMA Section
- The joint technical committees should include recommendations on how to effectively develop the U.S. position on regional and international standards
- Industry Executive Group will meet in April 2003 to review transition plan

Respectively submitted,

H. Jin Sim, Chair

Chrt02f.doc

2.0 Approval of Minutes of April 18, 2002 – H. Jin Sim

The Secretary notes that Member Dan Mulkey's name was inadvertently left out of the attendance summary for the Vancouver meeting. Mr. Mulkey attended, and was present at the Main Meeting on 4/18/02. The on-line posting of the Minutes will be corrected accordingly, and the Secretary regrets the error.

With the exception of this omission, the Minutes of the Vancouver meeting were approved as written

3.0 Administrative Subcommittee – H. Jin Sim

Chairman Jin Sim covered the key points of the Administrative Subcommittee Meeting held on October 20, 2002. 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, October 20, 2002, in the Board Room of the Renaissance Hotel and Business Center in Oklahoma City, Oklahoma, USA.

The following members of the Subcommittee were present:

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

The following guests were present:

Peter Balma	Joe Garza
Beverly Jenkins	Ray Nicholas

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.

3.3 Additions to and/or approval of the agenda

The previously communicated agenda was generally followed with no additions.

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

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 Oklahoma City Meeting, was approximately \$13,940, up from approximately \$8,114 prior to the start of the Vancouver Meeting. The budget is at a reasonable level to provide for appropriate financing of meeting preparations.
- Oklahoma City Registration status – Joe Garza of Southwest Electric provided an update on the status of meeting plans and registrations. Full details included in the Meetings Planning SC Minutes.
- Future Meetings (full details in the Meetings Planning SC Minutes):
 - March 16-20, 2003 – Raleigh, NC; hosted by ABB. Ray Nicholas and Beverly Jenkins provided an overview of the meeting arrangements, technical and companion tours, and the evening social planned for the Raleigh Museum of Art.
 - October 5-9, 2003 – Pittsburgh, PA; hosted by Pennsylvania Transformer Technologies
 - Spring '04 – San Diego, CA (under consideration at time of Admin SC Meeting)
 - Fall'04 – Edinburgh, Scotland (under consideration at time of Admin SC Meeting)

- Break Sponsorship – Greg Anderson outlined the pilot 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. ABB, Pennsylvania Transformer, and Waukesha Electric are participating in the pilot program by each sponsoring one break at this meeting. The sponsors chose not to display technical or promotional material at this meeting. If all goes as well as anticipated, the program will be expanded to include sponsorships for at least six breaks for the Raleigh Meeting. Sponsorship costs run roughly \$500 for a beverage break, and approximately \$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

The Minutes of the Vancouver Spring '02 Administrative SC and Main Committee Meetings contain documentation and background on the plans (at that time) for termination of the Memorandum of Understanding (MOU) between NEMA and IEEE related to the ASC (Accredited Standards Committee) process for ANSI approval of C37, C57, and C62 documents. Chairman Sim initiated discussion on the present status of this issue by providing a historical perspective, as follows:

Years ago, NEMA, IEEE, UL, and other organizations developed and maintained their own standards documents on an individual basis. In order to prevent duplication of effort and to make more effective use of volunteer's energy and talent, industry leaders developed methods to combine the work of some of these groups. One such method was the MOU between IEEE and NEMA for the work on transformer standards. NEMA previously had Working Groups (WG) for product related standards, and IEEE worked on standards related to ratings, testing, performance, and other issues. In the late 80's, this MOU turned over maintenance of all these transformer standards documents to IEEE, with joint copyright held by NEMA and IEEE. In the process, several NEMA sponsored WG's, specifically those related to distribution transformers, underground transformers and network protectors, and dry-type transformers, moved under the sponsorship of the Transformers Committee. In a parallel development, the ASC process was initiated to assure that inputs from sectors of the industry were appropriately included in the standards development and approval process, and to provide a means for approval of all these documents as ANSI standards. The ASC incorporated a delegation voting system, with 6 votes for the IEEE delegation, presently headed by Bipin Patel; 6 votes for the NEMA delegation; 6 votes for the Electric Light & Power delegation; and an additional 6 or 7 votes in a delegation of governmental agencies (WAPA, UL, USDA-REA, TVA, BPA, etc.). The ASC process for development and maintenance of transformer documents was outlined in another MOU between NEMA and IEEE.

In late 2001 the IEEE Standards Association Board of Governors (BoG) came to the conclusion that the present implementation of the ASC process was not continuing its effectiveness, and voted to discontinue the ASC process for ANSI approval of IEEE standards documents. That MOU has been terminated by IEEE, effective June 20, 2002. In response, NEMA contacted IEEE, indicating that

termination of the ASC MOU amounted to termination of the joint copyright MOU, and that NEMA intended to take back full responsibility for maintenance of the shared copyright documents. The present disagreement between NEMA and IEEE on the responsibility for these documents must be resolved. John Estey, currently a board member of NEMA and President of the IEEE Power Engineering Society (PES), invited a group of industry leaders and representatives of NEMA and IEEE to meet in Washington DC in July to discuss this problem. In general, conclusions were reached in the following areas:

- Standards development must continue, and there must be ways to improve the process
- Volunteer participation, required to maintain the quality of standards, is diminishing
- ANSI documents must continue to be consensus based documents, with inputs from producers and users
- A Task Force would be developed to make recommendations on the process.

That Task Force met in Chicago in September. The Industry recommendations are summarized on the following two communications forwarded by PES President John Estey to Committee Chair Jin Sim, and then forwarded to the Administrative SC.

September 18, 2002

Dear Industry Standards Participant:

As you know, earlier this year, the IEEE Standards Association (IEEE-SA) Board of Governors decided to terminate a Memorandum of Understanding with the National Electrical Manufacturers Association (NEMA) regarding the co-secretariat of ANSI Accredited Standards Committees C37, C57, and C62 (ASCs). As a result of this action, it became necessary to find new ways to develop and maintain the standards in the product areas of switchgear, transformers and surge arresters. To that end, on July 12, 2002 a group of about 25 gathered at NEMA's offices in Washington, including executives from manufacturers, electric utilities, and large power users plus the chairs of the ASC's, the chair of the IEEE PES Transformer Committee, the IEEE PES VP – Technical Activities, and staff members from NEMA and IEEE. That meeting produced some good basic direction and the decision was made to have a subset of that group meet to further define the direction for the future.

The subset group met in Chicago on September 13 and, after considerable deliberation, produced the attached recommendations for the future processes to develop and maintain standards in these product areas. During the deliberations, the group took strong note of the tremendous contribution made by the standards writers in our industry who make these contributions without much appreciation by the industry or their employers and who often need to do the work on nights and weekends. The group feels that there is a great deal that can be done to make this work easier and more enjoyable by simplifying and streamlining the process and by providing more support to the participants and more rigor to the management of standards projects. This theme runs throughout the recommendations. Since there is some urgency to getting on with the improvements to the process, this executive group remains committed to staying involved to help the standards-writing participants set a plan in place and

to ensure that resources are provided to implement this work. As a consequence, the group will work with the leadership of the NEMA Sections and the IEEE Technical Committees on the development and implementation of a transition plan, as outlined in the recommendations.

Greg Coulter GE Industrial Systems	John Estey S&C Electric Company	Robin Hurst Southern Company
Ben Johnson IEEE-SA	Brian Keys Commonwealth Edison Co.	Clive Kimblin Eaton Cutler Hammer
Frank Kitzantides NEMA	Daleep Mohla Dow Chemical Company	Doug Mader Entergy Services, Inc.
Frank Navratil Eaton Cutler Hammer	Jim Pauley Square D/Schneider Electric	Wanda Reder Commonwealth Edison Co.
Al Scolnik NEMA	David Stone Cooper Power Systems	Sue Vogel IEEE

**Electric Power Industry Executives Meeting
On Development of Standards for ANSI Adoption
September 13, 2002**

Recommendations

- ❖ Accredited Standards Committees C37, C57 and C62 are to be terminated
- ❖ As a beginning, IEEE and NEMA will pursue their respective standards with coordination between the two organizations to avoid overlap, duplication and conflicts
- ❖ The NEMA process for NEMA standards covering these products should to be altered to achieve balance, with users having an equal opportunity to participate fully throughout the process, including balloting. Users and general interest categories should be encouraged to participate.
- ❖ The separate NEMA and IEEE processes are for transition only. In the long term, the goal is to have the best process that makes the most efficient use of participant time and resources and produces the best standards, recognizing that the optimal process may be different for different product categories in the low-voltage, medium-voltage and high-voltage ranges. An implementation plan should be developed and presented to this body jointly by each IEEE Technical Committee and its NEMA Section counterpart by March 31, 2003. This should include a timeline and an analysis of how to simplify the structure of

the standards and standards-writing entities and to make it more accountable to the industry.

- ❖ Meetings involving related NEMA and IEEE standards should be held in a common venue with a well-organized agenda and efficient schedule to minimize travel cost and maximize utilization of participant time.
- ❖ The standards process should be made more efficient by:
 - Assigning firm schedules to projects that are enforced and with their progress reported publicly
 - Using electronic tools to cut travel and cycle time
 - Having employers engaged in the process, providing resources and time to their employees and monitoring progress
 - Having participants provide input at the beginning of the process and participating actively from beginning to end
 - Ensuring that Working Groups and Task Forces should all have sunset provisions and reporting accountability
- ❖ All participants are to be indemnified by the sponsoring organization.
- ❖ NEMA to remain the administrator for all TAGs involved in these products. The joint technical committees should make recommendations to this body on how to effectively develop the U.S. position on regional and international standards.

Subsequently, Sue Vogel of IEEE provided IEEE's perspective on their role, processes and scope, and suggestions on next steps needed. That perspective was also distributed to the Administrative SC prior to the Meeting, and is included following:

IEEE Process Improvements

- The IEEE-SA has new programs in place and under development to speed the process
 - IEEE Standards Development Online: automated web-based standards development process—24/7 access to all information and forms needed in order to develop their standards in an effective and timely way
 - Optimized Standards Services (OSS): under development for 2003. Will provide targeted service and support for standards development, based on a project's need

IEEE Structure is Available

- The IEEE-SA is prepared to process any standard previously approved solely through the ASC
 - A PAR is required
 - An invitation to ballot will be issued to Transformers ballot pool to form ballot group

- Anyone (individual or organization) can join the ballot pool; IEEE-SA membership or appropriate fee is required
- All IEEE Standards are submitted to ANSI for approval

IEEE Scope

- IEEE is not limited to nor can be obligated from developing only certain kinds of standards (e.g., application guides vs. preferred ratings)
 - Traditional roles need to be evaluated
 - Scope of Transformers Committee can accommodate different kinds of standards

The Path Forward: How We Can Help

- Recommend that the Transformers project inventory be reviewed and a spreadsheet for all projects be prepared indicating priority and short/long term plans
- What's under development/revision, when scheduled for review, reaffirmation, etc.
- Develop a simple project plan
- Include timeline and analysis

The Next Step

- Recommend assigning a Task Force to work with IEEE staff to develop what's needed for Industry Executive Group
- Get input from NEMA Section
- The joint technical committees should include recommendations on how to effectively develop the U.S. position on regional and international standards
- Industry Executive Group will meet in April 2003 to review transition plan

Discussion proceeded on the ASC process and how it was intended to work, and how it was actually performing. Concern was expressed that in several recent cases involving documents developed by the Transformers Committee one or more of the delegations did not respond at all to requests for ballots. General consensus in our meeting was that the ASC process added unnecessary and non-productive steps to the approval process.

Indemnification for those working, under the authority of the Transformers Committee, on documents for which NEMA now claims sole copyright, is another issue of concern. Until such time as implementation recommendations have been made and accepted, the Committee advises to continue Committee business as usual by continuing work on all documents and projects which have PAR's approved through normal IEEE procedures, on the understanding that IEEE indemnification prevails for work done under IEEE procedures.

Per the recommendations adopted at the Industry Executives Meeting, as indicated above, the Accredited Standards Committees (ASC) for C37, C57, and C62 are to be terminated, and the Transformers Committee is required to present implementation recommendations for ongoing development and maintenance of C57 standards by March 31, 2003. Chairman Sim made the following assignments:

- Tom Prevost was asked to coordinate a project inventory of Transformer document projects, including timelines, and specifically noting those projects affected by the NEMA copyright issue
- Task Force assigned to work with IEEE on implementation plans for future maintenance and development of Transformer documents, including Greg Anderson as TF Chair, and TF members Tom Prevost, Ken Hanus, Don Fallon, and Jin Sim. Other AdSubComm members are welcome to join also. Bipin Patel, Carl Niemann, and Ed Smith expressed interest in subsequent discussion.
- Bipin Patel was asked to coordinate input and communication with NEMA on these issues.

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

3.6.1 Ballots

The Delegation has responded to nine ballots since the meeting in Vancouver, Canada.

Eight affirmative ballots were returned as follows:

C57.12.32/D4.3	IEEE Draft Standard Requirements for Submersible Equipment - Enclosure Integrity"
C57.12.31/D1.4	Standard for Pole Mounted Equipment - Enclosure Integrity
C57.104/D10	Guide for the Interpretation of Gases in Oil Immersed Transformers
Std. 637-1985 Reaffirm	IEEE Guide for the Reclamation of Insulating Oil and Criteria for its Use
PC57.13.5/D.14.04	Draft: Trial-use Standard of Test Requirements for Instrument Transformers of a Nominal System Voltage of 115kV and above.
C57.19.03-1996 Reaffirm	IEEE Standard requirements, Terminology, and Test Code for Bushings for DC Application
PC57.12.00/D2	Revision: Draft Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

PC57.12.90/D2 Revision: Draft Standard Test Code for Liquid-Immersed
Distribution, Power, and Regulating Transformers

One ballot was returned disapproved as follows:

C57.12.34/D8 Rev.: "Draft: Requirements for Pad Mounted,
Compartmental-Type, Self-Cooled, Three-Phase
Distribution Transformers, 2500 kVA and Smaller: High
Voltage, 34 500 GrdY/19 920 Volts and Below; Low
Voltage, 480 Volts and Below"

3.6.2 IEEE/NEMA Copyright Issue for C57 Documents

An Industry Advisory meeting was held in Washington, D.C. on July 12, 2002 and subsequent to this meeting, various task forces were set-up to discuss the termination of MOU between IEEE and NEMA as co-secretariat of ASC C37, C57 and C62. The termination is effective as of June 10, 2002. (Reference Section 3.5, above)

3.6.3 Present Roster

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

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

Bipin K. Patel, Chair, IEEE Delegation to ANSI ASC C57 Committee

3.7 Committee Service Awards – B. K. Patel

Bipin Patel presented his report, which is included in the Committee meeting minutes. Tom Prevost commented that in addition to the recognition provided to Robert Olen for Chairing work on C57.12.31, he should also be recognized similarly for C57.12.32. Both enclosure integrity documents represented significant work effort. Comment was also made that Jerry Smith, recognized as Co-Chair of the WG on IEEE Standard 1388, has recently retired and will not be attending future meetings. The intent is to mention this at the Main Meeting so that members are made aware of Jerry's status.

In addition, Bipin noted receipt of a letter from Fred Willett's wife, expressing her pride at his dedication and accomplishments in working with Southwest Electric for over 30 years. Southwest Electric has agreed to recognize Fred at the Main Committee Meeting. The recognition will be a surprise to Bob.

3.8 Chair's report – H. J. Sim

Jin presented his report, which is included in the Committee meeting minutes. Particular note was made during the Administrative SC Meeting of the agreement between IEEE and IEC for the publication of dual logo documents. Any IEEE Standards which have no counterpart in IEC can be submitted for consideration for publishing under this agreement.

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.

3.10 Secretary's report – D. J. Fallon

3.10.1 Membership Review

Voting Members – Two new members, Craig Colopy of Cooper Power Systems, and Jim Fyvie, Consultant, recently retired from VA TECH Peebles Transformers, were added at the last meeting in Vancouver. Review of the membership is proceeding with contacts to members who have not been in attendance at any of the four most recent meetings. Based on those contacts, two members have indicated they can be removed from the roster due to changes in responsibility. These are Steve Smith of Kuhlman and Mark Loveless of Oklahoma Gas and Electric. In addition, information from the Dry-Type SC indicates that Tim Holdway is no longer involved in the industry. The Committee notes with appreciation the past contributions of these members, and removes their names from the roster. 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.

The Committee also notes with deep regret the passing of Emeritus Members Sal Bennon and Chuck McMillen. Both gentlemen contributed significantly to the Committee and to the Industry, and they leave behind many friends within our ranks. Though their names have been removed from the membership roster, they will be remembered.

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

Voting Members -		185
Classifications:	Producers -	92
	Users -	50
	General -	43
Life Members		1
Corresponding Members -		1
Emeritus Members -		18

The invitation list has approximately 555 names on it at this time. Review is also proceeding to remove Guests who have not attended recent meetings from the invitation list.

3.10.2 New Member Applications

Applications for Committee Membership have been submitted for:

- 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

These applications will be reviewed at the Administrative Subcommittee meeting. 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. New member applications can be forwarded to my 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. Updated SC Rosters must be submitted to PES in November for inclusion in the 2003 PES Directory. SC Chairs should forward updated SC Roster information to me by November 4. This information should be in the format prescribed by PES, per the PES message recently forwarded by Chairman Jin Sim. 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 Vancouver meeting were reproduced at a cost of \$1,883.58 for 390 copies and postage costs were \$1,875.15 for 368 mailings (279 within the US and another 79 worldwide), which averages \$10.21 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. Vancouver Minutes were mailed on October 1, with expected delivery to domestic US destinations by 10/4, and to international destinations by October 11.

Discussion will continue on plans to eventually eliminate printing and mailing of Minutes in favor of complete, timely, and user friendly availability on the Committee website. I note with appreciation that Webmaster Susan McNelly and Site Creator Georges Vaillancourt have done an excellent job in providing an accessible and useful website and in posting the Minutes.

We will strive for completion of the Oklahoma City Meeting Minutes at least 6-8 weeks prior to the next Meeting in Raleigh NC. Subcommittee Chairs are requested to submit their SC Minutes by December 9, 2002 for this Meeting. The submittal should be an electronic file via e-mail, formatted in Word 2000 (or earlier versions) and it would be appreciated if the minutes were put in the format as shown in the present Minutes, with numbering as indicated in the Main Committee Meeting (10/24/02) 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

Membership applications were reviewed and approved for the new member applicants identified in Section 3.10.2 (above). In addition completed applications were submitted during the meeting for Ron Daubert of Finley Engineering, and for Paul Orehek of Richards Manufacturing. These applications were reviewed and approved also. The Committee welcomes all these new members; Mr. Orehek is welcomed back in a renewal of his prior membership, with appreciation for his prior years of service as Chair of the Underground Transformers and Network Protectors SC.

The Secretary had contacted Bill Kennedy regarding a change in his membership status to Emeritus Membership. Bill's contributions to the Committee and the industry have been exceptional during his career with several manufacturers and have been highlighted by his service to the Committee as Chair of the HVDC Converter Transformers and Smoothing Reactors SC. Bill responded affirmatively to this recognition, and the Administrative SC unanimously approved and acclaimed his Emeritus status. Bill will be notified by letter, with appreciation for his years of dedicated service.

3.11 EEE Standards Activities – Naeem Ahmad

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

3.12 Standards Subcommittee - T. A. Prevost

3.12.1 Standards and coordination activities

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

- 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.
- Concern was expressed for difficulties in reaffirmation of C57.21 (IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA) stemming primarily from errors introduced by the scanning performed by IEEE.
- During the last meeting Tom had asked for suggestions for Committee Standards projects to use the fast-tracking process involving use of web-based tools and other IEEE facilities to accelerate standards development. The On-Line Monitoring Guide, under sponsorship of the Power

Transformers SC and WG Chairs Donald Chu and Andre Lux, is proposed as the Committee's flagship project in fast-tracking.

Tom also discussed concerns related to metrification of IEEE standards at this time. Notes on this discussion are included in Section 14 (Old Business).

3.12.2 Documents submitted to the Standards Board

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

3.13 Subcommittee Activities - Subcommittee Chairs

3.13.1 Audible Sound and Vibration - Jeewan Puri

No items to report to the Administrative SC.

3.13.2 Bushings - F. E. Elliott

Fred reported that Russ Nordman has changed jobs and may have to be replaced as TF Chair for the TF on Draw Lead Bushings.

In addition, Fred noted the potential need to reactivate the C57.19.01 WG on Dimensional Requirements for Bushings. The Standard will be up for reaffirmation shortly, and there is sufficient indication that a revision will be required in some areas and that a reaffirmation will not be approved. Chairman Sim agreed reactivation of the WG was a good idea.

3.13.3 Dielectric Tests - L. B. Wagenaar

Loren reported on three status changes for ongoing projects:

- The TF reviewing the Impulse Test Guide had been working under the authority of the WG on Revision of Transient Overvoltage Tests. The scope of this work has grown such that Loren recommends it be elevated to a separate WG. Art Molden, present TF Chair, will continue as WG Chair.
- Bertrand Poulin has resigned as Chair of the WG on Revision of Transient Overvoltage Tests. Pierre Riffon will take over the role as Chair.
- The TF work led by Phil Hopkinson on revision of the dielectric test values in the tables of C57.12.90 has grown such that Loren recommends elevation to WG status also. Phil will continue as Chair.

The Committee Chair accepted these recommendations.

3.13.4 Distribution Transformers – E. Smith

Ed noted his SC's process of requiring Co-Chairs for each WG, with one user and one manufacturer sharing the responsibility. John Lazar's work responsibilities have changed, and he has asked to be replaced as Co-Chair of the WG on single-phase pad mounted transformers. Jerry Smith must also be replaced as Co-Chair of the WG on Electronic Reporting on Test Data. Ed will review to find replacements for these Co-Chairs.

3.13.5 Dry-Type Transformers – Richard Dudley reporting for Chuck Johnson and Wes Patterson)

No items to report to the Administrative SC. Wes' difficulty in attending recent meetings due to his work responsibilities was noted. Chuck has been attending regularly, but was unable to make this meeting. Richard indicated further that Paulette Payne will be Chairing the SC Meeting this week.

3.13.6 HVDC Converter Transformers & Smoothing Reactors - Richard Dudley

Data and feedback is starting to come in on the project documents in publication, and the SC is initiating discussion on needs and process for future revisions.

3.13.7 Instrument Transformers - J. E. Smith

No items to report to the Administrative SC.

3.13.8 Insulating Fluids – F. J. Gryszkiewicz

Frank indicated interest and discussion of two possible subjects for new IEEE guides:

- Patrick McShane has suggested development of an IEEE Guide for Esther based, or vegetable based, fluids, and it may be appropriate to do so. Frank noted further that ASTM is proceeding with investigation of these fluids also, and that our work would be related to maintenance and use of such fluids.
- Need was noted for development of a Guide for the analysis of furanic compounds in insulating oils. Furanic compounds are released into the oil as cellulosic insulation ages and deteriorates.

Discussion will proceed with recommendation to follow if specific projects and WG's are needed.

3.13.9 Insulation Life – D. W. Platts

No items to report to the Administrative SC.

3.13.10 Performance Characteristics – R. S. Girgis

Ramsis noted to the group that there will be a PCS sponsored tutorial on Tuesday presenting material on a newly discovered phenomenon involving generation of hydrogen and methane from core hot spots related to core overexcitation.

Also under the sponsorship of PCS, Peter Balma reported that Bob Degeneff had met with representatives of the Switchgear Committee on the subject of common interest in PCS work on transient voltages due to transformer/breaker interaction. There is common understanding that a potential for problem exists, and there will be continuing dialogue between Committees as the PCS work proceeds. Greg Anderson noted that the topic of this work is under consideration for a future Tutorial session.

3.13.11 Power Transformers - E.G. Hager

Red Hager requested change of Tom Lundquist's status from Vice-Chair to Co-Chair of the Power Transformers SC. Chairman Sim accepted this recommendation.

3.13.12 Underground Transformers and Network Protectors – C. Niemann

Carl noted in the material he provided to update the PES Roster listing for the Transformers Committee that Brian Klaponski is the Chair for work on C57.12.40, having taken over from past Chair Leon Plaster.

3.13.13 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.

3.14 Old Business

3.14.1 Metrification Policy

This item was discussed during Tom Prevost's review of the Standards Report. The Transformer Committee remains concerned related to the safety impact of IEEE's Metrification Policy on some specific distribution product standards. In particular, many negative ballots were cast for C57.12.34, due to concern that the exclusive use of metric units would have a negative impact on safety during field handling of transformer equipment. The Committee felt that a waiver would reasonably be granted to add imperial of English units in parentheses, but that did not meet IEEE requirements. Tom went to the IEEE Standards Board Meeting in June to present the Committee's case. There was general agreement during discussion that the safety concerns were real, but at this point it appears that a blanket exception, even for safety concerns, is not a realistic expectation. Bruce Barrow, a dedicated volunteer and a strong proponent of metrification, indicated at the meeting that he would be willing to review the document to modify it to address the safety concerns and at the same time meet the IEEE metrification guidelines. Tom left with the understanding that such a review would be performed, and that the

appropriately modified document could then be re-submitted for ballot. Hopefully that ballot will be acceptable; if not there would be better justification for requesting a waiver from IEEE. . Steve Shull, the WG Chair for C57.12.34, was to be in contact with Bruce Barrow for this review. Status is uncertain at this time. Chairman Sim asked for assistance of other Committee members to work with Steve in moving this issue to resolution. There are additional documents following close on the heels of C57.12.34 that will have the same concerns.

3.14.2 Need for Continuation of WG Activities

Chairman Sim noted with concern that there have been several instances recently where WG activities were cancelled relatively close to meeting time, well after several revisions of planned schedules had been distributed. The first concern relates to the need to keep Committee activities on schedule and progressing. To that end, SC and WG Chairs are urged again to make sure the Co-Chairs and/or Secretaries are established so that meetings can continue even in the absence of the Chair. Most SC's and WG's do have this depth of leadership; the recommendation is for all to do so. Chairman Sim further directed that when personal or work circumstances dictate that WG leadership cannot attend, the SC Chair shall take over to lead the WG meeting. Chairs are again reminded that this concern is a measure of the respect afforded our work, and that many attendees, and their supporting employers, budget time and expense to attend our meetings based on the expectation that scheduled WG meetings will take place. Addressing a second concern, in the event it will not be productive to convene a WG session at a particular meeting (document completed, ballot approved, and in process for final approval and publication, for example), notice of that WG meeting should be withdrawn from the schedule at the first opportunity for schedule review, well prior to the meeting. This courtesy will help alleviate concerns expressed by several attendees. The Chair thanks all SC and WG Chairs for their cooperation.

There were no other items of old business.

3.15 New Business

3.15.1 Thursday Morning Main Meeting Function and Value – Don Platts

Don brought up a concern for the value of the Thursday morning Main Committee Meeting as presently structured. He questions whether the time and expense our companies make in providing for attendance on Thursday is bringing sufficient return. A good portion of the meeting is spent in announcements of future meeting plans and various recognitions, and then SC Chairs are encouraged to rapidly recount activities with sometimes only sketchy details. As our meetings are intended to be technical in nature, and as the status and capability of the website and electronic communications can easily do a better job of posting and transmitting the information usually dispensed on Thursday, Don questions whether the Thursday meeting should be reviewed for possible changes in focus. There was general agreement that this concern is valid. Discussion also moved to the effectiveness of the extension of the schedule to incorporate an extra day of meetings to minimize conflicts. Chairman Sim supported the need for more technical content. Administrative SC members were asked to provide specific recommendations on improvement of the Thursday meeting structure and content – to be forwarded to Chairman Sim for review at the next Administrative SC Meeting. Peter Balma commented on the value

of recognition, and suggested that this function be moved to the Tuesday Luncheon, taking advantage of the larger audience available earlier in the week.

3.15.2 Single Database of Committee Roster and Contact Information

The Chair brought up the need to incorporate or unify the Committee roster information into one database. The Secretary maintains the Roster used for invitations and mailings; there is a separate meeting registration database administered with assistance from IEEE at present, and each SC Chair and WG maintains their own information as well. The Chair asked Greg Anderson and Don Fallon to review and report back on plans for combining at least some of these functions into a single database. Tom Prevost requested to be kept in the loop, as he hopes eventually to include the Standards Association roster in this unification.

3.15.3 Printing of Committee Minutes

Continuing the practice of printing and distributing hardcopy of the Minutes, as opposed to moving to exclusive or primary availability on-line and through electronic transmission, remains an item of discussion. Several members have expressed a desire to continue the practice of printing. Even with options for publicly available web access for those without personal capability, personally printing Minutes can be difficult and costly. Chairman Sim also points out that some members indicate their preference for having a printed copy for review at the subsequent meeting. The Chair asked whether we should make a decision now, or consider further and plan to make a decision in Raleigh. Printing and mailing costs average about \$9-10 per copy, and recent printings included just under 400 copies. Printing at cost is one item considered. We do need to consider that our O&P Manual requires distribution of Minutes to all members, and although the format is not specified, changes from printed format may create problems for some. At Thursday's Main Meeting, the Secretary will assess the interest of attendees present in continuation of printing or moving to electronic format as the primary medium for distribution.

There were no other items of New Business.

3.16 Adjournment

Chairman Sim adjourned the meeting at 5:41 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>
2003	Raleigh, NC	Pittsburgh, PA	Sim
2002	Vancouver, BC, Canada	Oklahoma City, OK	Sim
2001	Amsterdam, The Netherlands	Orlando, FL	Patel
2000	Nashville, TN	Niagara Falls, ON, Canada	Patel
1999	New Orleans, LA	Monterey, Mexico	Matthews
1998	Little Rock, AR	Guanajuato, Mexico	Matthews
1997	Graz, Austria (summer)	St. Louis, MO	Binder
1996	San Francisco, CA	Burlington, VT	Binder
1995	Kansas City, MO	Boston, MA	Harlow
1994	Dallas, TX	Milwaukee, WI	Harlow
1993	Portland, OR	St. Petersburg, FL	Borst
1992	Birmingham, AL	Cleveland, OH	Borst
1991	Phoenix, AZ	Baltimore, MD	Veitch
1990	Denver, CO	Montreal, PQ, Canada	Veitch
1989	Chicago, IL	Charlotte, NC	Veitch
1988	Washington, DC	Long Beach, CA	Compton
1987	Ft. Lauderdale, FL	New Orleans, LA	Compton
1986	Little Rock, AR	Pittsburgh, PA	Yannucci
1985	St. Louis, MO	Toronto, ON, Canada	Yannucci
1984	Vancouver, BC, Canada	Boston, MA	Savio
1983	Atlanta, GA	Detroit, MI	Savio
1982	Los Angeles, CA	Philadelphia, PA	McNutt
1981	Portland, OR	Phoenix, AZ	McNutt
1980	Williamsburg, VA	Milwaukee, WI	Bonucchi
1979	San Diego, CA	Houston, TX	Bonucchi
1978	Miami, FL	Chattanooga, TN	Bennon
1977	Charlotte, NC	Montreal, PQ, Canada	Bennon
1976	New Orleans, LA	San Francisco, CA	Honey
1975	Lakeland, FL	Denver, CO	Honey

4.0 Editor's Report – M. Christini

Between April and October 2002, a total of (73) papers in the transformer area (including both new and revised papers) were submitted to IEEE Transactions on Power Delivery. During this time (68) reviews were completed and (5) reviews are in-progress. For completed reviews, the recommendations were: Accept without changes (33), Accept with mandatory changes (25), and Reject (10). A complete summary of these papers is listed below.

All members of the IEEE Transformer Committee are invited to review technical papers. To review IEEE Transaction Papers on transformers, you can 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

Finally, 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

TR12 0151999RA1.R1	Transformer Phase Coordinate Models Extended for Grounding System Analysis	Svenda	Rev. No
2000TR093.R1	Accurate Modeling of Core-type Distribution Transformers for Electromagnetic Transient Studies	Noda	New No
2000TR527.R3	Dynamic Modelling of Transformer Core From Experimental Hysteresis Data	Akcay	Rev, No
2000TR609.R1	Measurement of Lambda-I Characteristics of Asymmetric Three-Phase Transformers and Their Applications	Fuchs	Rev. No

2001TR178.R1	Estimating Overpressures in Pole-Type Distribution Transformers Part I: Tank Withstand Evaluation	Hamel	New No
2001TR182.R1	Estimating Overpressures in Pole-Type Distribution Transformers Part II: Prediction	Dastous	New No
2001TR244RA1.R1	Condition Assessment of Power Transformer On-Load Tap-Changers Using Wavelet Analysis and Self-Organizing Map: Field Evaluation	Birtwhistle	New No
2001TR253.R2	Design of A High Power Brushless Linear Variable Transformer	Faiz	Rev. Yes
2001TR274.R1	A Harmonic Model For the Nonlinearities of Single-Phase Transformer With Describing Functions	Huang	Rev. Yes
2001TR282.R2	Experience With Return Voltage Measurements For Assessing Insulation Conditions in Service Aged Transformers	Saha	Rev. No
2001TR394.R2	Reducing Losses in Distribution Transformers	Olivares	Rev. Yes
2001TR419.R2	A Newly Modified Forced Oil Cooling System and Its Impact On In-Service Transformer Oil Characteristics	Wahab	Rev. No
2001TR452.R2	Study of Abnormal Electrical Phenomena Effects On GSU Transformers	Y. Liu	Rev. No
2001TR454.R1	New Solid-State On-Load Tap-Changers Topology For Transformers	Faiz	New No
2001TR466.R1	Real-Time Dynamic Loading and thermal Diagnostic of Power Transformers	Lachman	Rev. No
2001TR495.R1	Fast Ferroresonance Suppression of Coupling Capacitor Voltage Transformers	Graovac	New No
2001TR580.R2	A Novel Extension Method for Transformer Fault Diagnosis	M. H. Wang	New, No
2001TR632.R1	Evolving Neural Nets For Fault Diagnosis of Power Transformers	Y-C Huang	New, No
TPWRD-00037-2002.R1	Data Mining Approach for Analysis of Power Transformer Dissolved Gas Records Using the Self-Organising Map	Thang	New, No

TPWRD-00039-2002.R1	A Study on Transformer Loading in Manitoba -- Part I: Peak-load Ambient Temperature	X. Li	New, No
TPWRD-00049-2002.R2	PSpice Computer Model of a Non-linear Three-phase Three-legged Transformer	Pedra	Rev. No
TPWRD-00058-2002.R1	A New Data Mining Approach for Dissolved Gas Analysis of Oil-Insulated Power Apparatus	Y-C Huang	New, No
TPWRD-00066-2002.R2	Coolant Flow Distribution and Pressure Loss in ONAN Transformer Windings - Part 1: Theory and Model Development	J. Zhang	Rev. Yes
TPWRD-00067-2002.R2	Coolant Flow Distribution and Pressure Loss in ONAN Transformer Windings - Part 2: Optimization of Design Parameters	J. Zhang	Rev. Yes
TPWRD-00106-2002.R1	Proposed Standards for Frequency Conversion Factors of Transformer Performance Parameters	teNyenhuis	New, Yes
TPWRD-00109-2002.R2	Computation of Very Fast Transient Overvoltages in Transformer Windings	Popov	Rev. No
TPWRD-00140-2002	A wide-band lumped circuit model of eddy current losses in a coil with a coaxial insulation system and a stranded conductor	Holmberg	New, No
TPWRD-00145-2002.R1	Temperature Responses to Step Changes in the Load Current of Power Transformers	H. Nordman	New, No
TPWRD-00152-2002.R1	Harmonic Frequency Leakage Fluxes in 3-Phase, 3-Winding Converter Transformers	Forrest	New, No
TPWRD-00186-2002.R2	Prediction of Hottest Spot Temperature (HST) in Power and Station Transformers	Pradhan	Rev. No
TPWRD-00196-2002.R1	A new Method for the calculation of the Hot-spot Temperature in power Transformers with ONAN Cooling	Radakovic	Rev. No
TPWRD-00212-2002.R1	A simple method for calculating core temperature rise in power transformers is complete.	Ryder	New, Yes
TPWRD-00223-2002.R2	REVIEW OF TIME-DOMAIN POLARISATION MEASUREMENTS FOR ASSESSING INSULATION CONDITION IN AGED TRANSFORMERS	Saha	Rev. No

Revise and Resubmit

TR9 028 1999	Characterizing Internal Faults in Distribution Transformers Using Computer Simulation And Field Experiments	K. Butler	Rev, No
2000TR527.R1	Dynamic Modeling of Transformer Core From Experimental Hysteresis Data	Akcay	Rev, No
2000TR527.R2	Dynamic Modeling of Transformer Core From Experimental Hysteresis Data	Akcay	Rev, No
2001TR253.R1	Design of A High Power Brushless Linear Variable Transformer	Faiz	Rev. No
2001TR282.R1	Experience With Return Voltage Measurements For Assessing Insulation Conditions in Service Aged Transformers	Saha	Rev. No
2001TR394.R1	Reducing Losses in Distribution Transformers	Olivares	Rev. No
2001TR419.R1	A Newly Modified Forced Oil Cooling System and Its Impact On In-Service Transformer Oil Characteristics	Wahab	Rev. No
2001TR452	Study of Abnormal Electrical Phenomena Effects On GSU Transformers (Part 1 of 2: Effects of Switching Transients)	Y. Liu	Rev. No
2001TR452.R1	Study of Abnormal Electrical Phenomena Effects On GSU Transformers (Part 1 of 2: Effects of Switching Transients)	Y. Liu	Rev, No
2001TR453	Study of Abnormal Electrical Phenomena Effects On GSU Transformers (Part 2 of 2: Effects of SFC Operation & Lightning)	Y. Liu	Rev. No
2001TR580.R1	A Novel Extension Method for Transformer Fault Diagnosis	M. H. Wang	New, No
TPWRD-00010-2002.R1	Transformer Design Optimization with Consideration of Restrained Inrush Current and Low Leakage Inductance	Cheng	Rev. No
TPWRD-00031-2002	Experimental Development of Superconducting Fault Current Limiting Transformer (SFCLT) for Electric Power System	Hiroaki	Rev. No
TPWRD-00037-2002	Data Mining Approach for Analysis of Power Transformer Dissolved Gas Records Using the Self-Organising Map	Thang	Rev. No
TPWRD-00049-2002	PSpice Computer Model of a Non-linear Three-phase Three-legged Transformer	Pedra	Rev. No

TPWRD-00049-2002.R1	PSpice Computer Model of a Non-linear Three-phase Three-legged Transformer	Pedra	Rev. No
TPWRD-00057-2002	Seismic Response of Transformer-Bushing Systems	Ersoy	Rev. No
TPWRD-00066-2002.R1	Coolant Flow Distribution and Pressure Loss in ONAN Transformer Windings - Part 1: Theory and Model Development	J. Zhang	Rev. Yes
TPWRD-00067-2002.R1	Coolant Flow Distribution and Pressure Loss in ONAN Transformer Windings - Part 2: Optimization of Design Parameters	J. Zhang	Rev. Yes
TPWRD-00160-2002	A Simplified Transformer Thermal Model Based On Thermal-Electric Analogy	Tang	Rev. No
TPWRD-00186-2002.R1	Prediction of Hottest Spot Temperature (HST) in Power and Station Transformers	Pradhan	Rev. No
TPWRD-00196-2002	A new Method for the calculation of the Hot-spot Temperature in power Transformers with ONAN Cooling	Radakovic	Rev. No
TPWRD-00212-2002	A simple method for calculating core temperature rise in power transformers is complete.	Ryder	New, Yes
TPWRD-00223-2002	Review of Time-domain Polarization Measurements for Assessing Insulation Condition in Aged Transformers	Saha	Rev. No
TPWRD-00223-2002.R1	Review of Time-domain Polarization Measurements for Assessing Insulation Condition in Aged Transformers	Saha	Rev. No

Reject

2001TR453.R1	Study of Abnormal Electrical Phenomena Effects On GSU Transformers (Part 2 of 2: Effects of SFC Operation and Lightning)	Y. Liu	Rev. No
2001TR649	De-rating of Distribution Transformers For Non-Sinusoidal Load Currents Using Finite Element Method	Faiz	Rev. No
TPWRD-00010-2002.R2	Transformer Design Optimization with Consideration of Restrained Inrush Current and Low Leakage Inductance	Cheng	Rev. No
TPWRD-00040-	A Study on Transformer Loading in Manitoba -- Part II:	X. Li	Rev,

2002.R1	Loading Capability		No
TPWRD-00044-2002.R1	Research on a New and Efficient Spherical Adsorbent for On-Site Regeneration of Transformer Oil	Peng	Rev, No
TPWRD-00117-2002	Power Flow Analysis in Transformers by Electromagnetic Fields	Edwards	Rev, No
TPWRD-00191-2002	A Novel Extension Neural Network for Power Transformer Fault Diagnosis	Wang	Rev, No
TPWRD-00233-2002	A Grey-Extension Method for Power Transformer Fault Forecasting	Wang	Rev, No
TPWRD-00258-2002	The Needs for Derating of the Distribution Transformers in Macedonian Power System	Shikoski	Rev, No
TPWRD-00295-2002	Wavelet Transform based Impulse Fault Pattern Recognition in Distribution Transformers	Purkait	Rev, No

Still In Progress

TPWRD-00213-2002	Procedures for detecting Winding Displacements in Power Transformers by the Transfer Function Method	Christian	
TPWRD-00246-2002	Vibro-acoustic techniques to diagnose power transformers	Bartoletti	
TPWRD-00354-2002	An Improved Low Frequency Transformer Model for use in GIC Studies	Chandrasen ai	
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	Olivares	

5.0 Vice Chair's Report – K. S. Hanus

The Vice Chair was unable to attend the meeting. His report had been submitted prior to the meeting, and was reviewed by the Chair. The full report follows below.

5.1 PES Technical Council Committees

The following are reports on activities of PES Committees on which the Vice Chair serves as Committee representative. All of the meetings reported were held at the 2002 Summer Meeting in Chicago, IL on July 21-24, 2002.

5.1.1 Technical Sessions

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

- a. PES will continue to publish Technical Committee promotional articles in the new Power & Energy Magazine. The emphasis will be on present and future activities. The length of the article is at the discretion of the author. It may include: technical information, announcement of new working groups and task forces, membership information, and recruitment's for new members. Recently Greg Anderson submitted an article for the Transformers Committee highlighting a recent meeting. Many thanks to Greg for putting the article together and his efforts to use the article to promote the activities of the committee.
- b. Mel Olken gave a presentation on the new PES publication titled "Power & Energy". Mel is the new editor of this publication which will replace the "PE Review" and "Computer Applications in Power" magazines beginning January, 2003. The new publication will be issued bi-monthly.
- c. John Paserba gave an update on the planning for the first "Even Year" meeting to be held in the fall of 2004. One annual PES meeting will be held in the early summer of each year (Toronto –2003, Denver-2004). Another meeting will be held in the fall of each year. In the odd numbered years this meeting will be the T& D Conference (Dallas-2003). John chairs a committee that is planning the fall meeting that will occur during even numbered years.
- d. Jim Harlow gave a presentation on the need to capture information presented in panel sessions. Abstracts for panel sessions are currently printed in the meeting proceedings. The PES officers have expressed a desire to capture the actual presentations given during the panel sessions. These presentations might then be posted on the PES Website. A lengthy discussion followed with a sampling of some of the comments from:

Susan Sacks – What would be the content?

Dan Nordell – Use Microsoft PowerPoint® and capture the speakers notes.

Greg Wlech – Would only submit Adobe Acrobat PDF files.

George Nail – Concern about the size of the files.

Bruce Dietzman will draft a policy proposal to be submitted to the Technical Council for review. This proposal will address the request of the PES officers. As an interim response, Bruce requested that the

panel chairs ask the presenters in their upcoming sessions to provide them a copy of their PowerPoint presentations. Bruce will collect these presentations and have the Executive Office post them on the PES Website on a trial basis.

e. Susan Sacks, along with other members of the Executive Office staff, gave a presentation on the changes in the Author's Kit and the status of electronic publications.

f. Chair Dietzman expressed his thanks and appreciation to the members of the Technical Sessions Committee. He stated that he had truly enjoyed working with the committee and that the members of the committee had made his job very easy. He then introduced Keith Gray who will assume the Chair's position beginning on January 1, 2003.

g. Anne Marie Sahazizian, TPC for the 2003 General Meeting gave a report on the technical program for the meeting to be held in Toronto. Anne Marie stated the program would be based on five tracks which included Asset Management, Risk Management, Telecommunications Information & Control, Industrial Power Distribution and Developments in Power Engineering Technologies.

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.

Manuscript Submission: Complete manuscripts are to be submitted electronically via the PES General Meeting 2003 web site, which will be linked to the PES home page (www.ieee.org/power). The site will be available for submissions beginning early November, 2002 through January 13, 2003. Authors will be notified of the decision regarding their paper by the end of February, 2003. The site's URL will be announced at a later date. Please check the PES web site and the PES Author's Kit for manuscript formatting and preparation instructions and more information about submission as it becomes available

5.1.2 Organization and Procedures Committee

5.1.2.1 Technical Committee Activity Reports

There was much discussion on the scope of the Power System Communications Committee". It was noted the scope needed more information about security and safety. It was also noted the scope should not encroach on the NEC or NESC safety issues.

Malcolm Thaden discussed the need of O&P manuals addressing the handling of position papers. He suggested looking at the SA website and the requirements of the SA O&P manual for guidance. This may be something the Transformers Committee may want to look at doing.

5.1.2.2 Revision of the Technical Council Organization and Procedures Manual

There was no discussion about the Transformers Committee O&P Manual as it was approved during the New York TCOP meeting.

5.2 Technical Paper Reviews

5.2.1 Technical Paper Review Summary

Between April and October 2002, a total of (73) papers in the transformer area (including both new and revised papers) were submitted to IEEE Transactions on Power Delivery. During this time (68) reviews were completed and (5) reviews are in-progress. For completed reviews, the recommendations were: Accept without changes (33), Accept with mandatory changes (25), and Reject (10).

5.2.2 Technical Paper Session at 2002 Winter Meeting

We had two technical sessions with 6 proceedings papers and 3 transactions papers presented during the IEEE/PES 2002 Summer meeting in Chicago, IL, July 21 – 25, 2002.

5.2.3 Technical Paper Session at 2003 Summer Meeting

At this point there are four transactions papers proposed for the Toronto meeting, therefore it is likely the committee will sponsor two technical sessions at the meeting. The deadline for submission is January 13, 2003 and the final program for technical sessions will be finalized sometime in March 2003.

Respectfully submitted, K.S. Hanus, Vice Chair

6.0 Transformer Standards - T. A. Prevost

The Standards Sub Committee met on Wednesday October 23, 2002.

6.1 Chairs Remarks:

6.1.1 Ballot Pool:

The chair commented that the maintenance of the ballot pool is an individual's responsibility. This requires that everyone who would like to participate in Transformer Committee ballots have their correct information (particularly e-mail address) in the IEEE balloting database. This can be done by accessing the IEEE web site below:

- <http://standards.ieee.org//dblbballoting/ballotform.html>
- **There is no way at this time to determine if a member has a correct e-mail address. The best way to insure that a correct address is in the database is to re-enter your information.**
- If you have not received an invitation to ballot any Transformer committee standards in the last six months then it is safe to assume that you are not in the ballot pool.
- A list of ballot pool members will be circulated at the main committee meeting on Thursday.

6.1.2 Web Based Tools:

IEEE has developed web based tools to facilitate work for working group members between meetings. Two working groups have agreed to utilize these tools and report to the subcommittee. These are:

- C57.143 Guide for Application of Monitoring to Liquid-Immersed Transformers and Components
- C57.98 Guide for Impulse Tests

6.1.3 Metrification:

The issue of metrification of Transformer Committee standards is presently resting with the approval of C57.12.34 'Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 2500 kVA and Smaller: High-Voltage, 34 500GrdY/19 920 Volts and Below; Low Voltage, 480 Volts and Below – Requirements' In June the Standards Board reviewed the request by the working group to allow dual dimensioning (Inch-Pound and Metric). The chair of SCC 14 (Review of Standards for compliance to IEEE metric policy) commented that he had not had an opportunity to review the request and offer a solution. The action that was decided was that the C57.12.34 WG chair should work with the SCC 14 chair to accommodate metric issues. These would then be incorporated into the next revision and recirculated.

Ron Stahara and Steve Shull, joint chairs of C57.12.34, have developed a new revision which includes normative annexes and footnotes which guide metric conversion. This revision will be recirculated with the hope of approval.

6.2 Reports of WG's:

6.2.1 C57.12.00, C57.12.90 - Subhash Tuli

- The latest revision of these standards has been balloted with several negatives resulting. Subhash is currently working with the commenters and negative balloters to resolve negatives and incorporate comments where appropriate. A recirculation ballot will need to be conducted. We expect to have the recirculation ballot complete by the end of 2003.

6.2.2 PC57.144 WG on Guide for Metrification of Transformer Standards – Dudley Galloway

- The WG now has an active PAR
- Latest draft is posted on the TR Comm web site. It includes a spreadsheet which guides metric conversions as well as significant units.

6.2.3 WG on Grounding Transformers - Steve Schappell.

- Surge Protective Devices Committee working group C62.91 (IEEE 32): Revision to Requirements and Tests for Neutral Grounding Devices has decided to transfer maintenance of this standard to the Transformers Committee. This will be a new WG with Steve Schappell as chair. Steve has applied for a PAR under the number of PC57.32. The WG will be contacting manufacturers of grounding devices to gain input as well as users. This WG will be transferred to the Performance Characteristics subcommittee.

6.3 New Business

6.3.1 IEEE 62: IEEE Guide for Diagnostic Field Testing of Electric Power Apparatus - Part 1: Oil Filled Power Transformers, Regulators, and Reactors

This standard needs to be reaffirmed and maintained. It has a 1995 date. The subcommittee reviewed the status and decided that the best course of action would be to reaffirm the standard and then start a revision project based on comments received during the reaffirmation process. Wally Binder has agreed to be WG chair for the reaffirmation process. The reaffirmation ballot should be issued early in 2003.

6.4 Standards Activities Since the April, 2002 Meeting

Significant items from Tom Prevost's October 20, 2002, Report to the Administrative SC follow. The Attachments referenced are included at the end of the Minutes.

TRANSFORMERS STANDARDS AND COORDINATION ACTIVITIES

The transformers standards status is given with two attachments:

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.

Attachment 2 is a report of coordination activity on standards belonging to other PES Committees. This attachment is sorted by PES Committee names.

DOCUMENTS SUBMITTED TO THE STANDARDS BOARD

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

1 May 2002

NEW PARS

PC57.12.28 (PE/TR) Standard for Pad Mounted Equipment - Enclosure Integrity
Recommendation: Approve new PAR until December 2006.

PC57.12.29 (PE/TR) Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments
Recommendation: Approve new PAR until December 2006.

12 June 2002

TARGET EXTENSION REQUESTS

PC57.12.33 (PE/TR) Guide for Distribution Transformer Loss Evaluation
Recommendation: Approve target extension request until December 2004.

11 September 2002

TARGET EXTENSION REQUESTS

PC57.12.34 (PE/TR) Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 2500 kVA and Smaller: High-Voltage, 34 500GrdY/19 920 Volts and Below; Low Voltage, 480 Volts and Below
Recommendation: Approve target extension request until December 2004.

PARS FOR REVISIONS OF STANDARDS

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

Recommendation: Approve PAR for the revision of a standard until December 2006 (9 approve, 0 disapprove, 2 abstain).

IEEE-SA STANDARDS BOARD REVIEW COMMITTEE (RevCom)

RECOMMENDATIONS

12 June 2002

NEW

PC57.123/D1.8 (PE/TR) Guide for Transformer Loss Measurement

Recommendation: APPROVE [vote: yes=9; no=0; abstain=1]

REVISION

PC57.12.23/D4 (PE/TR) Standard for Underground Type, Self-Cooled, Single-Phase, Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage 25000 V and Below; Low Voltage 600 V and Below; 167 kVA and Smaller

Recommendation: APPROVE

PC57.106/D7 (PE/TR) Guide for Acceptance and Maintenance of Insulating Oil in Equipment

Recommendation: APPROVE [vote: yes=8; no=0; abstain=2]

REAFFIRMATION

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

Recommendation: APPROVE

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

Recommendation: APPROVE

11 September 2002

NEW

PC57.12.31/D1.4 (PE/TR) Standard for Pole Mounted Equipment - Enclosure Integrity

Recommendation: APPROVE [vote: yes=10; no=0; abstain=1 (Thompson)]

PC57.12.32/D4.3 (PE/TR) Standard for Submersible Equipment - Enclosure Integrity
Recommendation: APPROVE [vote: yes=10; no=1 (Thompson); abstain=0]

PARs to be Withdrawn

This is the final notice that you will receive regarding the expiration of the project(s) shown below. If the extension request for the project(s) is not received by 1 November 2002 or is not submitted to RevCom for final approval by the same date, the project(s) will be administratively withdrawn at the 11 December 2002 Standards Board meeting. For instructions on how to request an extension, please see the e-mail below.

Please feel free to contact me if you have any questions.

Best regards,

Jodi Haasz

Senior Administrator

IEEE-SA Governance and Electronic Processes

Standards Activities

Phone +1 732 562 6367

FAX +1 208 460 5300

Email: j.haasz@ieee.org

This letter is to advise you that the projects listed below will expire at the end of 2002 and action will be required.

- PC57.104 Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers
- PC57.113 Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors
- PC57.12.25 Standard for Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage, 34500 GrdY/19920 Volts and Below, Low Voltage, 240/120 Volts; 167 kVA and Smaller - Requirements
- PC57.12.80 Standard Terminology for Power and Distribution Transformers
- PC57.13 Standard Requirements for Instrument Transformers
- PC57.133 Guide for Short Circuit Testing of Distribution and Power Transformers

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

If the projects will not be submitted to RevCom in time for the December 2002 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.html>. 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 1 November 2002, the projects will be recommended for administrative withdrawal at the 11 December 2002 IEEE-SA Standards Board meeting.

If you should have any further questions, please contact me at 732-562-6367 or by e-mail at j.haasz@ieee.org.

Standards to be Withdrawn

PE/TR has some standards that are due for their 5-year review by the end of 2002. {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 1 NOVEMBER 2002 SUBMITTAL DEADLINE (FOR THE DECEMBER 2002 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 2002. {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:

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

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

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

C57.13-1993 IEEE Standard Requirements for Instrument Transformers
{Note: The PAR for PC57.13 is due to expire in December 2002. Please contact Jodi Haasz [j.haasz@ieee.org 1-732-562-6367], NesCom Administrator, for action on PARs.}

C57.19.00-1991 (R1997) IEEE Standard general Requirements and Test Procedure for Outdoor Power Apparatus Bushings
{Note: The PAR for PC57.19.00 is due to expire in December 2002. Please contact Jodi Haasz [j.haasz@ieee.org 1-732-562-6367], NesCom Administrator, for action on PARs.}

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

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

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

C57.91-1995 IEEE Guide for Loading Mineral-Oil-Immersed Transformers
{Note: The PAR for PC57.91-1995/Cor 1 may be affected. Please contact Jodi Haasz [j.haasz@ieee.org 1-732-562-6367], NesCom Administrator, for action on PARs.}

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

Oil-Immersed Transformers

{Note: The PAR for PC57.104 is due to expire in December 2002. Please contact Jodi Haasz [j.haasz@ieee.org 1-732-562-6367], NesCom Administrator, for action on PARs.}

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

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

{Note: The PAR for PC57.113 is due to expire in December 2002. Please contact Jodi Haasz [j.haasz@ieee.org 1-732-562-6367], NesCom Administrator, for action on PARs.}

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

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

NEXT STANDARDS BOARD MEETINGS AND SUBMITTAL DEADLINES

Meeting date

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

December 9, 2002

November 1, 2002

March 18, 2002

February 7, 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>.

Current List of ALL Open Standards Project (from IEEE Web site October 17 ,2002)

Designation: 1524

Sponsor: Power Engineering Society/Transformers

Title: Guide for the definition of Thermal Duplicate Liquid-Immersed Distribution, Power, and Regulating Transformers

Status: Superseded **This project has been superseded by PC57.145.

Technical Contact: Barry L Beaster, Phone:314-679-4838, Email:barry.beaster@us.abb.com

History: PAR APP: Jun 25, 1998

Designation: PC57.12.00

Sponsor: Power Engineering Society/Transformers

Title: Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

Status: Revision Project

Technical Contact: Subhash C Tuli, Phone:262-547-0121x1428,

Designation: PC57.12.01

Sponsor: Power Engineering Society/Transformers

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

Status: Revision Project

Technical Contact: Anthony J Jonnatti, Phone:727-785-2788, Email:premo2@aol.com

History: PAR APP: Mar 18, 1999

Designation: PC57.12.10

Sponsor: Power Engineering Society/Transformers

Title: Standard Requirements for Liquid-Immersed Power Transformers

Status: New Standard Project

Technical Contact: Javier Arteaga, Phone:414-547-0121

History: PAR APP: Jun 13, 2002

Designation: PC57.12.20

Sponsor: Power Engineering Society/Transformers

Title: Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller: High Voltage, 34500 Volts and Below; Low Voltage, 7970/13800Y Volts and Below

Status: Revision Project

Technical Contact: Glenn W Andersen, Phone:704-382-4323, Email:gwanders@duke-energy.com

History: PAR APP: Dec 6, 2001

Designation: PC57.12.25

Sponsor: Power Engineering Society/Transformers

Title: 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

Status: Revision Project

Technical Contact: John P Lazar, Phone:612-493-1608, Email:john.p.lazar@xcelenergy.com

History: PAR APP: Dec 8, 1998

Designation: PC57.12.28

Sponsor: Power Engineering Society/Transformers
Title: Standard for Pad Mounted Equipment - Enclosure Integrity
Status: New Standard Project
Technical Contact: Robert C Olen, Phone:262-835-3362, Email:rolen@cooperpower.com
History: PAR APP: May 9, 2002

Designation: PC57.12.29
Sponsor: Power Engineering Society/Transformers
Title: Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments
Status: New Standard Project
Technical Contact: Robert C Olen, Phone:262-835-3362, Email:rolen@cooperpower.com
History: PAR APP: May 9, 2002

Designation: PC57.12.33
Sponsor: Power Engineering Society/Transformers
Title: Guide for Distribution Transformer Loss Evaluation
Status: New Standard Project
Technical Contact: Thomas J Pekarek, Phone:330-761-7800, Email:tjpekarek@firstenergycorp.com
History: PAR APP: Jun 25, 1998

Designation: PC57.12.36
Sponsor: Power Engineering Society/Transformers
Title: Standard Requirements for Liquid-Immersed Distribution Substation Transformers
Status: New Standard Project
Technical Contact: John R Rossetti, Phone:901-528-4743, Email:jrossetti@mlgw.org
History: PAR APP: Jun 13, 2002

Designation: PC57.12.37
Sponsor: Power Engineering Society/Transformers
Title: Standard for the Electronic Reporting of Distribution Transformer Test Data
Status: Revision Project
Technical Contact: Jerry W Smith, Phone:228-865-5849, Email:jwsmith@southernco.com

Designation: PC57.12.90
Sponsor: Power Engineering Society/Transformers
Title: Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
Status: Revision Project
Technical Contact: Subhash C Tuli, Phone:262-547-0121x1428,
Email:subhash.tuli@waukeshaelectric.spx.com
History: PAR APP: Jun 14, 2001

Designation: PC57.13
Sponsor: Power Engineering Society/Transformers
Title: Standard Requirements for Instrument Transformers

Status: Revision Project

Technical Contact: Thomas L Nelson, Phone:301-975-2986, Email:thomas.nelson@nist.gov

History: PAR APP: Jun 14, 1994

Designation: PC57.13.1

Sponsor: Power Engineering Society/Power System Relaying

Title: Guide for Field Testing of Relaying Current Transformers

Status: Revision Project

Technical Contact: M Meisinger, Phone:773-338-1000, Email:mmeisinger@sandc.com

History: PAR APP: Jun 25, 1998

Designation: PC57.15

Sponsor: Power Engineering Society/Transformers

Title: Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators

Status: Revision Project

Technical Contact: Thomas Diamantis, Phone:315-428-5688, Email:diamantist@nimo.com

History: PAR APP: Dec 7, 2000

Designation: PC57.19.00

Sponsor: Power Engineering Society/Transformers

Title: Standard General Requirements and Test Procedure for Power Apparatus Bushings

Status: Revision Project

Technical Contact: Fred E Elliott, Phone:360-418-2607, Email:feelliott@bpa.gov

History: PAR APP: Jun 20, 1996

Designation: PC57.91-1995/Cor 1

Sponsor: Power Engineering Society/Transformers

Title: Corrigenda for C57.91-1995, Guide for Loading Mineral-Oil-Immersed Transformers

Status: New Standard Project

Technical Contact: Linden W Pierce, Phone:706-235-1805, Email:piercelw@aol.com

History: PAR APP: Mar 30, 2000

Designation: PC57.93

Sponsor: Power Engineering Society/Transformers

Title: Guide for Installation of Liquid-Immersed Power Transformers

Status: Revision Project

Technical Contact: Michael Lau, Phone:604-528-3201, Email:mike.lau@bchydro.bc.ca

History: PAR APP: Jun 13, 2002

Designation: PC57.98

Sponsor: Power Engineering Society/Transformers

Title: Guide for Transformer Impulse Tests

Status: Revision Project

Technical Contact: Arthur Molden, Phone:845-225-0993, Email:ameesco@worldnet.att.net

History: PAR APP: Sep 12, 2002

Designation: PC57.104

Sponsor: Power Engineering Society/Transformers

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

Status: Revision Project

Technical Contact: Frank W Heinrichs, Phone:724-941-6924, Email:frankus@usaor.net

History: PAR APP: Dec 10, 1996

Designation: PC57.113

Sponsor: Power Engineering Society/Transformers

Title: Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors

Status: Revision Project

Technical Contact: Bertrand Poulin, Phone:408-957-8326, Email:bertrand.f.poulin@ca.abb.com

History: PAR APP: Jun 20, 1996

Designation: PC57.130

Sponsor: Power Engineering Society/Transformers

Title: IEEE Trial-Use Guide for the Use of Dissolved Gas Analysis During Factory Temperature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors

Status: New Standard Project

Technical Contact: Frank J Gryszkiewicz, Phone:617-926-4900x213, Email:frankg@doble.com

Designation: PC57.133

Sponsor: Power Engineering Society/Transformers

Title: Guide for Short Circuit Testing of Distribution and Power Transformers

Status: Revision Project

Technical Contact: Nigel P McQuin, Phone:412-824-2165, Email:n.p.mcquin@ieee.org

History: PAR APP: Sep 21, 1995

Designation: PC57.139

Sponsor: Power Engineering Society/Transformers

Title: Guide for Dissolved Gas Analysis in Transformer Load Tap Changers

Status: New Standard Project

Technical Contact: Richard K Ladroga, Phone:978-630-8865, Email:rkl@proteuseng.com

History: PAR APP: Dec 9, 1997

Designation: PC57.140

Sponsor: Power Engineering Society/Transformers

Title: • Life Extension of Power Transformers

Status: New Standard Project

Technical Contact: Rowland I James, Phone:504-576-6246, Email:rjames@entergy.com

History: PAR APP: Sep 16, 1999

Designation: PC57.141

Sponsor: Power Engineering Society/Transformers

Title: Guide for the Application of Load Tap Changers

Status: New Standard Project

Technical Contact: William R Henning, Phone:262-547-0121, Email:whenning@ieee.org

History: PAR APP: Jun 26, 1999

Designation: PC57.142

Sponsor: Power Engineering Society/Transformers

Title: A Guide To Describe The Occurrence And Mitigation Of Switching Transients Induced By Transformer-Breaker Interaction

Status: New Standard Project

Technical Contact: Robert C Degeneff, Phone:518-276-6367, Email:degenr@rpi.edu **History:** PAR APP: Dec 7, 2000

Designation: PC57.143

Sponsor: Power Engineering Society/Transformers

Title: Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components

Status: New Standard Project

Technical Contact: Andre Lux, Phone:919-856-3888, Email:andre.e.lux@us.abb.com **History:** PAR APP: Mar 21, 2002

Designation: PC57.144

Sponsor: Power Engineering Society/Transformers

Title: Guide to Metric Conversion of Transformer Standards

Status: New Standard Project

Technical Contact: Dudley L Galloway, Phone:573-635-7587, Email:gallowaytt@aol.com

History: PAR APP: Mar 21, 2002

Designation: PC57.119

Sponsor: Power Engineering Society/Transformers

Title: Recommended Practice for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Rating

Status: New Standard Project

Technical Contact: Subhash C Tuli, Phone:262-547-0121x1428, Email:subhash.tuli@waukeshaelectric.spx.com

History: PAR APP: May 16, 2000

7.0 Recognition and awards – B. K. Patel

7.1 Certificates of Appreciation

Certificates of Appreciation have been obtained for the following persons:

<u>Name</u>	<u>Service Rendered</u>
Craig Colopy	WG Co-Chair, C57.15 - IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators.
Dave Rolling	WG Co-chair, IEEE Standard 1388-2000 - IEEE Standard for the Electronic Reporting of Transformer Test.
Jerry Smith	WG Co-chair, IEEE Standard 1388-2000 - IEEE Standard for the Electronic Reporting of Transformer Test.
Joe Kelly	WG Chair, Revision of C57.106 - IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment.
Tom Lundquist	WG Co-chair, C57.135 - Guide for the Application, Specifications and Testing of Phase-shifting Transformers.
Edgar Trummer	WG Co-chair, C57.135 - Guide for the Application, Specifications and Testing of Phase-shifting Transformers.
Al Traut	WG Co-Chair, C57.12.23 - 2002 - Standard for Underground Type Self-Cooled, Single-Phase, Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage 25 000 V and Below; Low Voltage 600 V and Below; 167 kVA and Smaller.
Roger Lee	WG Co-Chair, C57.12.23 - 2002 - Standard for Underground Type Self-Cooled, Single-Phase, Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage 25 000 V and Below; Low Voltage 600 V and Below; 167 kVA and Smaller.
Robert Olen	WG Chair, C57.12.31 - Standard for Pole Mounted Equipment – Enclosure Integrity.
Joseph S. Garza	Host recognition for Oklahoma City meeting.
Bob Veitch	Distinguished Service Award.

7.2 Nominations for IEEE, PES, and Technical Council Awards

The following award nomination has been submitted:

- Transformers Committee for Technical Council Technical Committee Distinguished Service Award

The following two award nominations are being prepared for submission:

- PES Working Group 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.

- 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.

7.3 Awards – General

The following are deadlines for various awards for this year and next:

AWARD	NOMINATION DEADLINE	NOMINATION SENT To
PES Prize Paper Award	November 1	Mohammad Shahidehpour
PES Working Group Award (Technical Report)	November 1	Mohammad Shahidehpour
PES Working Group Award (Standard or Guide)	November 1	Mohammad Shahidehpour
“High Interest” Paper	November 1	Noel Schulz
Alfred Nobel Intersociety Award	November 1	Noel Schulz
Technical Committee Prize Paper Award	November 1	Noel Schulz
Technical Committee Distinguished Service Award	November 1	Noel Schulz
Tech. Com. Working Group Recognition Award	November 1	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

Mr. Mohammad Sahidehpour of Illinois Institute of Technology is a new chair of the PES Paper Awards Committee.

7.0 Recognition and Awards (cont'd)

From next year, the IEEE general meeting format will change to one general meeting. As a result some of these deadlines may change.

When we meet in Oklahoma City later this month we will still have time to nominate for other awards by November 1, 2002.

B.K.Patel, Chair, Awards Subcommittee

8.0 Meetings Planning Subcommittee -- G. W. Anderson

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

The meeting began at 3:00 p.m., Wednesday, October 23, 2002 in the Renaissance Hotel in Oklahoma City, Oklahoma, USA. Eighteen (18) people were in attendance. Greg Anderson, SC Chair facilitated. The meeting began with introductions by the attendees.

8.1 Committee Finances

Committee funds are presently (as of August 12, 2002) \$13,940.43.

8.2 Past & Present Meetings

8.2.1 Past Meeting - Vancouver, B.C., Canada

Mike and Nancy Lau and the Host Team at BC Hydro did an excellent job of planning and implementing the meeting in Vancouver, British Columbia. Despite the continued depressed economy, the attendance was good (280 attendees and 81 companions/spouses). The facilities and the staff at the Westin Bayshore were excellent with its proximity to Stanley Park.

On Saturday, Mike and Nancy hosted a spectacular full-day excursion trip for 68 "early-birds" to the Capital City of Victoria on Vancouver Island. Additionally, three technical tours were offered at this meeting and attendance for both tours were non-restricted (anyone could attend). On Sunday morning, 55 people visited BC Hydro's Powertech Labs. Powertech also treated the group to a nice luncheon at a Vancouver Chinese restaurant. Powertech hosted a similar tour on Thursday afternoon for an additional 15 attendees. On Monday evening, 45 people visited NxtPhase's Optical Sensing Manufacturing Facility. We appreciate the work and hospitality from each of these companies.

During our Tuesday Luncheon (161 attendees), Mr. Ron Threlkeld, Sr. VP, Transmission, at B.C. Hydro presented an interesting topic titled "Dealing with Aging Assets - Human & Infrastructure". On Wednesday evening, we enjoyed a sit-down dinner at the famous Vancouver Aquarium (225 attendees). On Monday, 60 companions enjoyed a tour of Vancouver City and Chinatown, and the world-famous Stanley Park. They were treated to lunch at Queen Elizabeth Park and later a tour of The University of British Columbia's Museum of Anthropology. On Tuesday, the 61 companions visited the Capilano Suspension Bridge, a salmon hatchery, and enjoyed a lunch on top of Grouse Mountain.

8.2.2 Present Meeting - Oklahoma City, Oklahoma, USA

Joe Garza gave a brief report of the on-going meeting. Attendance was good (280 attendees and 81 companions). Joe and Southwest Electric Company enlisted professional meeting planning services of Ms. Jennifer Anderson at ASE Productions, Inc. The entire Host team did a great job of planning and implementing the meeting.

On Sunday morning, 90 attendees attended a tour of Southwest Electric Company's Transformer Repair Facility. Those attendees were treated to a great BBQ lunch under tents at the plant. An additional 8 people attended a similar tour on Thursday afternoon.

Historian, Humorist & Former Oklahoma Governor Mr. George Nigh entertained 176 attendees at the Tuesday Luncheon with a very humorous speech. On Wednesday evening, 174 people attended the "Stetsons at Sunset" dinner social at the National Cowboy & Western Heritage Museum. On Monday, 32 companions enjoyed a sobering tour of the Oklahoma Memorial Center and Myriad Gardens and a national homes tour. On Tuesday, 25 companions enjoyed a tour of the historic town of Guthrie and a tour of the Scottish Rite Temple.

8.3 Future Meetings

8.3.1 Summary

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

- March 16-20, 2003 -- Raleigh, North Carolina, USA, at the Sheraton Capital Center Hotel. Hosted by Ray & Brenda Nicholas and ABB, Inc.
- October 5-9, 2003 -- Pittsburgh, Pennsylvania, USA, at Sheraton Station Square. Hosted by Dennis & Merritt Blake and Pennsylvania Transformers Technology, Inc.
- Spring 2004 -- San Diego, California, USA
- Fall 2004 -- Edinburgh, Scotland

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

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

ABB will host the Spring 2003 Meeting in Raleigh, North Carolina. Ray & Brenda Nicholas will be the Host and Hostess. The meeting will be held at the Sheraton Capital Center Hotel. Room rates are \$124/night (without taxes), single or double occupancy. Two technical tours are planned. On Sunday morning, we will go to Waukesha Electric System's Goldsboro (North Carolina) Transformer Plant. On Thursday afternoon, we will go to ABB's South Boston (Virginia) Small Power Transformer Plant (Thursday afternoon). It is likely that this meeting will have a "switchgear focus" with possible interactions with the PES Switchgear Committee and a couple of tutorials/presentations on the subject.

The Wednesday Evening Dinner Social will be held at The North Carolina Museum of Art. Companion tours will include tours of the Raleigh/Durham area and shopping at the nearby Triangle Town Center. John Estey, current President of the IEEE/PES, will speak at the Tuesday Luncheon.

Ms. Beverly Jenkins from ABB's Raleigh Office is assisting Ray with the planning of the meeting. Greg commended ABB for allowing Ms. Jenkins to attend the Oklahoma City Meeting to become familiar with the details (it is always recommended that someone from the next host's planning team attend the preceding meeting).

Ray Nicholas, Engineering Manager at ABB South Boston can be reached at (434) 575-2133 or ray.nicholas@ieee.org. Beverly Jenkins is a good source of travel and local information and can be reached at (919) 856-3807 or beverly.a.jenkins@us.abb.com.

8.3.3 Upcoming Fall 2003 Meeting (October 5-9) -- Pittsburgh, Pennsylvania, USA

Dennis Blake gave a brief summary of the Fall 2003 Meeting. The meeting will be held at the Sheraton Station Square. Room rates are \$135/night (without taxes), single or double occupancy. Technical tours of the Pennsylvania Transformer Technology, Inc (PTTI) plant.

Dennis Blake can be reached at PTTI at (724) 873-2123 or dennis.blake@ieee.org.

8.4 Working Group Report

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

The working group meeting was held at as a breakfast meeting at 7:00 am on Wednesday, October 16, 2002. There were 14 people present. No one from IEEE HQ was represented.

Representatives from the following technical subcommittees were not present:

- Audible Sound & Vibration
- Dry-type
- Instrument Transformers
- Insulating Fluids
- Standards
- UTNP

The agenda for the meeting was as follows:

1. Introductions
2. Latest Changes to Web-Site Structure & Subcommittee Web-Pages
3. Procedure for releasing SC passwords
4. Adjourn

Sue McNelly was not able to attend the meeting due to a death in the family, but facilitated the meeting via conference call. Sue's MS-Powerpoint presentation was viewed as she led the meeting. This

worked well.

8.4.1.1 Latest Changes to Web-Site Structure & Subcommittee Web-Pages

A brief demo of the latest changes to the web site was shown. The primary focus was the ownership of the SC web pages and WG pages and to give members an understanding of what they can do with their pages and to stress that they need to take ownership of the pages and keep them up to date and useful.

8.4.1.2 Procedure for Releasing SC Passwords

The group discussed the use of the security that had already been put in place. The overall agreement was that it would be too burdensome to have each individual Subcommittee have its own username and password for access to the secure documents. It was felt that all Transformer Committee members should have access to the documents in each of the SC and WG areas. Therefore, it was agreed that a single protected folder with a single username and password would be implemented. The password will be changed twice yearly with the new password announced at the Thursday Main Committee meeting and would be effective the first Monday following the meeting.

There were also discussions about what type of information should be posted in the secure areas. Rosters was mentioned as a possibility, however, it was felt that posting the SC or WG rosters was not necessary and that instead on the respective SC or WG pages a list of member names only would be provided when made available by the Chair of each group to the Webmaster. Since the Chair contact information is available, if someone has a need for further contact information, they can contact the group Chair. For that reason, the secured area will primarily be used for drafts of standards that individual groups are presently working on. Groups that want to have a document posted need to send the information to Sue McNelly with instructions on The SC and/or WG, (she doesn't always know what SC the WG are under). If no WG web page is presently available, the Chair will need to provide additional information such as WG scope, Chair contact information, Secretary information (if there is one), WG members, and any other information that they would like to see placed on the page.

8.5 New Business

8.5.1 Mailing of Meeting Minutes

Meeting Minutes are presently "snail-mailed" to all Committee members and the attendees of that associated meeting. In the near future, we will stop mailing the Meeting Minutes document. For the last year or two, meeting minutes have been posted on the Committee's web-site. The cost of reproducing and mailing each document is approximately \$10-15/each. This expense is "bundled" into each meeting's registration fee. Although they Committee and its attendees could immediately benefit financially from moving to exclusively web-based minutes, there are at least a couple of issues that need to be addressed.

One obvious issue is the surprising fact that 2/3 of our members have never used the Internet. A solution to this would be to print-out the document and mail a hard-copy to only those people. Another possible solution would be to "un-bundle" the cost of reproducing and mailing the minutes and allow an

attendee the option to having minutes mailed to them. This could be done by allowing an attendee to select and pay for this option during the meeting registration process.

Another issue is that the present format of our minutes is not "web-friendly". The minutes need to be re-organized before we can begin publishing the minutes solely as a web-based document. This issue will be addressed in a future meeting.

8.5.2 Tutorials/Presentations

Two technical tutorials/presentations were presented at this Oklahoma City 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:

- "Transformer Specifications Beyond Standards", by Jeff Fleeman and Loren Wagenaar
- "H₂ Generation in Mildly Overheated Transformer Cores", by Ramsis Girgis and Ed teNyenhuis

Future candidate presentations include: Net Meetings (On-line Meetings and Remote Conferencing), Switching Transients (a summary of work by Bob Degenoff's WG), Partial Discharge Detectors (by Jack Harley and others), Web-based Review of PES Technical Papers, Temperature Detectors (by Philip McClure and others), Environmentally-friendly Fluids (by Patrick McShane and others), Moisture in Transformers (by TV Oommen), Loss Tolerance & Measurement (by Ramsis Girgis), and National Energy Policy (by Phil Hopkinson). It was also suggested that a future presentation be held on to summarize the changes in the revised Bushing Guide, C52.19.01.

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. Therefore, a certificate of attendance will be provided at future presentations. At this Oklahoma City Meeting, we provided a means for attendees to download the certificate from the web-site and bring to the presentation for the instructor to personally sign. This process worked well 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.

8.5.3 Coffee Break Sponsors

At the Vancouver Meeting, we discussed allowing coffee break sponsors (or "patrons"). Joe Watson agreed to administrate the process and coordinate sponsors. As a pilot project at this Oklahoma City Meeting, we highlighted three vendors at breaks. 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. Contact Joe to apply for future sponsor opportunities.

8.5.4 Schedule Changes - New Lunch & Breakfast Meetings

At the Oklahoma City Meeting, 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. This worked well and was well accepted. At the Raleigh Meeting, we will hold several meetings at new timeslots to avoid conflicts with other meetings. The "Newcomers Orientation" (typically facilitated by the Committee Vice Chair) will be moved to a Monday breakfast timeslot. The "Standards Development Process Review" (facilitated by the Standards Coordinator) will be moved to the Monday luncheon timeslot. Attendees at this meeting will be able to register for this lunch with the on-line meeting registration system. Finally, the "WG for Web-site Development" will continue at the Wednesday breakfast timeslot.

8.5.5 Committee Historians

At the Spring 2002 Meeting, Greg suggested that the Committee should 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 5-10 years. The CD could perhaps be presented as a gift to all Committee Members and made available to meeting guests and other interested individuals. We continue to look for someone to champion this effort.

8.6 Miscellaneous

Additional topics were discussed:

At the Spring 2002 Meeting, it was discovered there was a security problem with the reflector e-mail system. Apparently, several people were able to view the entire mailing list if they attempted to "reply to all" after receiving a reflector message. The IEEE was notified and they denied that this was possible. We immediately disabled the system until a solution was found. We modified the system to a "monitored system" that requires all messages to be approved by a moderator (presently Greg Anderson) before disseminating. The reflector policy on our web-site has been modified and the system is working well with no further apparent security problems.

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 TC "mailing list" maintained by SC Secretary, the attendee list for each TC meeting, the standards ballot lists, and individual membership lists maintained by SC & WG chairs. It would be helpful if databases used by the Committee were relational, centrally-located, and the contact information was self-maintained by the members.

Greg again encouraged everyone to create their own "IEEE e-mail alias address" - an excellent service provided free of charge by IEEE. An alias is a permanent e-mail address that remains the same, even if the user moves to a different company or ISP. For instance, Greg uses "gwanderson@ieee.org" and

has used that same address for years, even though he has changed employers twice. A message sent to an individual's alias is immediately re-directed to an e-mail address chosen by the individual. For instance, an e-mail sent to Greg's alias is immediately forwarded to his HDR address. The alias service also provides excellent virus filtering, and often, a person can create a much simpler (shorter) e-mail address than the one provided by their employer. An alias also identifies a person as an IEEE member. A link to the IEEE e-mail alias service is provided within the Committee's web-site.

The 9/11 Event and the depressed economy have affected our meeting attendance. 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 execute a "between meetings" 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.

Finally, 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.

The meeting was adjourned.

Respectfully Submitted, Greg Anderson, SC Chair

9.0 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/>).

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

The S.C. met in Room 15 of the Cox Business Services Convention Center in Oklahoma City, Oklahoma on Oct. 21, 2002 from 1:45 p.m. - 3:00 p.m. There were 7 members and 7 guests present. One of the guests Raj Ahuja of Waukesha requested membership. The following are the highlights.

1. The minutes of the Vancouver meeting were approved.
2. There is no equivalent for IEEE 1277 (smoothing reactors for HVDC application) in IEC. It may qualify for publication as a joint IEC/IEEE standard. The chairman stated that he would follow up with Jin Sim.
3. A number of recent HVDC projects in the U.S. may provide the bases for feedback on IEEE C57.129 and IEEE 1277. Projects include the Rapid City Tie in North Dakota and the Sylmar upgrade.
4. In the next revision of IEEE C57.129 the scope should be expanded and a specific annex added to cover transformers used in voltage source converter based HVDC schemes. Much of the testing of such transformers will be consistent with that for AC power transformers.
5. Peter Heinzig gave a presentation on a proposed annex A.5 for C57.129 covering the use of impedance analyzers to determine the Loss Adjustment Factors. The use of electronic impedance analyzers to determine Loss Adjustment Factors used in the calculation of harmonic losses for converter transformers is an alternative to the use of a signal generator/power amplifier and electronic wattmeter to directly obtain the harmonic losses. (It should be noted that no voltage dividers or CTs should be used with wattmeters in order to achieve maximum accuracy). Per Peter's experience the impedance analyzer approach was straightforward and produced accurate results. It is proposed that the two methods be included in the proposed annex.

Peter presented the results of load loss measurements on a 282 MVA converter transformer for an HVDC project. The results obtained using IEEE C57.129 and Annex A.4 (IEC method) agreed within 2.52% (maximum difference) of those calculated according to IEEE 1158.

A copy of Peter's presentation will be sent to S.C. members with the minutes.

Input is requested from Allan Forrest as he has a great deal of experience on this subject.

6. The issue of overloading of converter transformers should be addressed in the next revision of IEEE C57.129; probably in an informative annex. The overloading of converter transformers vs AC power transformers should be presented and differences fully explained; harmonics and current waveshape. The annex should also include information on how to carry out overload tests in the lab. The main problem is the lab ambient temperature (usually high after a temperature rise test) vs actual overloading conditions (usually low ambient). Waldemar Ziomek will produce a first draft of an annex for the next meeting in Raleigh.

7. Potential projects for the S.C. are variable reactors for filters in HVDC schemes and commutation reactors for voltage source converters. When is the appropriate timing? Should they be covered as part of existing standards?

8. Fred Elliot requested feedback on the DC bushing standard from the HVDC Converter Transformer and Smoothing Reactors S.C. Per S.C. members impulse test levels for DC bushings on converter transformers is an issue. The DC bushing standard requires a 15% safety margin for the DC hipot but it is being applied to lightning and switching impulse. This is a serious issue per some S.C. members. S.C. members should provide direct input to Fred Elliot on this issue and others with copies to the chairman and other S.C. members.

The meeting adjourned at 3:00 p.m.

Submitted by R. Dudley

9.2 Instrument Transformers SC – Jim Smith, Chair

7 members and 9 guests attended

9.2.1 Chair's Remarks & Announcements:

The dates and locations for future meetings were announced.

The previous meeting minutes were approved as written

9.2.2 Old Business:

None

9.2.3 New Business

Study Group on Partial Discharge Testing -

At the next SC meeting, IEC 60270 will be reviewed. Pierre Riffon will furnish copies for the SC members to review by the next meeting.

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. The members are to bring their recommendations to the next meeting.

IEC TC38 -

Vladimir Khalin will email the TC-38 minutes to the members of the subcommittee.

9.2.4 Working Group Reports:

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

(1) The draft 14.04 was balloted with consensus result. Because of an unresolved negative vote, the draft D15 was submitted to the standards association for re-circulation. The closing time for the second ballot is mid-November 2003.

At the same time the PAR revision was made regarding to the title of the document and extension of the project to December 2003. This revised PAR was submitted to RevCom for approval.

(2) The remaining time of the sessions was devoted to the presentation and resolution of the balloting comments for draft D14.04.

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

Chair's remarks & Announcements:

The WG met on October 22, with four members and nine guests present.

Old business-

- The minutes from the last meeting in Nashville, TN (spring 2000) were reviewed. Key updates were:

- 1) Recognition of industry use of a 'stepped' accuracy 0.3 at 5% and 0.15 at 100% rated current. This was added to C57.13.6, and identified as 0.15 accuracy.
- 2) It was agreed that this additional rating would require four test points to meet the higher level of accuracy certification intended by this high accuracy standard.
- 3) Addition of the letter 'S' to the 0.15 'step-less' accuracy class, which is defined from 5% thru the Rating factor (now 0.15 S accuracy class). This is similar terminology to IEC's best accuracy designation.

New business-

- A draft of C57.13.6 updated (revision 10) since Nashville meeting circulated for review. Editorial corrections noted at that meeting reviewed and accepted. It was suggested to require four test points for the 0.15 S accuracy class. Justification was the use of 'dynamic' compensation schemes that cause faster registration at 5% than at rated current. Countering this is the argument that these types of compensation represent a small percentage of the CT designs, especially high accuracy type. This represents a cost increase for all (high accuracy) products to account for a few. Other factors to consider additional tests required for dual (0.3 accuracy class) products.
- Action Items:
 - A 'real time' survey of attending members was taken, and the chair will address comments and seek consensus in the coming weeks.
 - The standard will be forwarded to the editorial staff.
 - Balloting will follow

9.2.4.3 Working Group on C57.13 Revision – Tom Nelson

The working group met on October 22. There were 10 members and 2 guests present. The draft standard had been surveyed within the working group, and the subcommittee with the responses returned being affirmative. The draft was also sent to IEEE editorial for their comments. The changes suggested by IEEE were made, and the draft will be submitted for ballot. The working group then held a lively discussion on the merits of partial discharge testing for materials other than oil. It is expected that the balloting will be finished and the next meeting in March, will be used to resolve any negative ballots.

9.2.4.4 Study Group on C57.13.2 – Tony Jonatti

PAR request to be made

Minutes Submitted by Ross McTaggart

9.3 Insulating Fluids SC – F. J. Gryzkiewicz, R. K. Ladroga, Co-Chairs

9.3.1 Introduction/Attendance

The Insulating Fluids Subcommittee and its Working Groups met in Oklahoma City, Oklahoma on Tuesday and Wednesday, October 22 and 23, 2002. The Subcommittee started its meeting at 11:00 a. m. on Wednesday. There were 20 members and 19 guests present. Seven guests requested Subcommittee membership at the meeting. The Subcommittee membership now stands at 77.

9.3.2 Approval of Meeting Minutes

The minutes of the April Vancouver, British Columbia meeting were approved as printed.

9.3.3 Old Business

9.3.3.1 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 is scheduled to be printed in November of 2002.

9.3.3.2 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 will be conducted soon.

9.3.3.3 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 chaired by Frank Heinrichs. There has been little activity with this project since the last meeting. This is due to the fact that Frank also chairs the Working Group on C57.104 which will be sent out for a Recirculation Ballot. Frank wants to complete the revision of C57.104 first and then will conduct a Recirculation Ballot on C57.130.

9.3.3.4 C57.111 – IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance on 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.

9.3.3.5 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, October 22, 2002 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 Raleigh.

9.3.3.6 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. The PAR had expired and Bill has obtained a new one. A Standards Association Recirculation Ballot will be conducted soon.

9.3.3.7 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 will vote to approve this document at their next meeting in December.

9.3.4 New Business

9.3.4.1 The Analysis of Furanic Compounds in Insulating Oil.

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

The Subcommittee discussed this item at their meeting. The Members believed that a separate IEEE document covering this topic is not needed. Since the furanic analysis is a test performed on insulating oil, it was suggested that this topic be included in the next revision of C57.106.

9.3.4.2 Guide for the Acceptance and Maintenance of Natural Ester Based Fluids.

Patrick McShane of Cooper Power Systems recommended that the Subcommittee consider writing a Guide on this topic. After some discussion, the Subcommittee voted to approve Patrick's recommendation. A Working Group, consisting of the following, was formed:

Patrick McShane – Chair

T.V. Oommen

Alan Wilks

Kent Haggerty

The Working Group will obtain a PAR and prepare an outline for discussion at the next meeting in Raleigh.

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

A Study Group meeting was conducted on Wednesday, October 23, with 10 in attendance. The purpose of the meeting was to discuss the information contained in Tables 4A and 4B. These tables 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.

As a result of the Study Group meeting, it was decided that a Working Group would be formed after a PAR is obtained. Since only one subsection will be revised at this time, Jim Thompson will attempt to apply for a limited scope PAR. This Working Group, when formed, will meet at the next meeting in Raleigh. Jim Thompson and T.V. Oommen will be Co-Chairs of the Working Group.

9.3.5 Adjournment

The Subcommittee adjourned at 12:30 p.m.

9.3.6 Next Meeting

The Insulating Fluids Subcommittee and its Working Groups will next meet in Raleigh, North Carolina, March 16-20, 2003.

Submitted by F. J. Gryszkiewicz

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

The Insulation Life Subcommittee met at 8:00 AM Wednesday, October 23, 2002 in Oklahoma City. Attendance was 26 members and 58 guests.

The minutes of the April 17, 2002 meeting in Vancouver BC were approved after correction of the last meeting location (It had been reported as Orlando, rather than Vancouver).

9.4.1 Chair's Report

9.7.1.1 ADCOM meeting on Sunday. Details of the discussions will be reviewed in the Main Committee meeting. There were no items that directly effected the work of this subcommittee.

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

Our next subcommittee meeting will be in Raleigh, NC on March 19, 2003.

9.4.2 Status Reports for active projects:

Subhash Tuli reported 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 comment. Some of them will be forwarded to our subcommittee for resolution.

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 must be revised to clean up those errors.

There were some negatives and Linden is working to get both of these documents ready for the Standards Board.

9.4.3 Working Group reports were as follows:

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

The Working Group did not meet.

This working group meeting was cancelled after the schedule was published, and clearly demonstrates the need for additional involvement. The chair again asked for a volunteer to assist Linden with this working group.

Don Platts reiterated the need for this document to appropriately cover loading of distribution transformers and called for volunteers to contact him if they are interested in that topic. We will work to develop a reasonable approach, rather than merely stating that the required test data is usually not available so therefore, the guide cannot be applied.

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

The Working Group did not meet. Barry has resolved the issues with the expired PAR. Their draft document was balloted, and it has recently closed.

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

The meeting convened at 1:55 PM following the luncheon, which ran long. Five members and twelve guests signed the attendance roster, though the mid meeting headcount was 23.

The minutes of the Spring 2002 meeting in Vancouver were approved.

Old business:

During the meeting in Vancouver a call for volunteers was issued for authors to write sections on the Users' and Transformer Manufacturer's perspectives on winding temperature measurement. The response was good, and the four authors who contributed were recognized.

The section on Transformer Manufacturer's perspective is still mostly incomplete, and a list of questions were provided in an effort to guide potential authors as to the type of information and structure required for the paper.

The user section which deals with operation and ownership of WTI's is also incomplete, and a similar list of questions was provided to guide potential user-authors.

A brief discussion of the electrical environment section was conducted in order to establish whether users were specifying standards for EMI/RFI and surge immunity. Those attendees who had experience with the subject indicated that C37.90.1-1989 was their standard of choice.

A discussion of a new section dealing with thermal curve libraries was conducted. The intention of this section is to introduce the concept of establishment of a set of actual, carefully constructed thermal profiles, generated from heat runs from a variety of transformers, from which the response characteristics of calculating WTI's could be evaluated.

During the discussion it was stated that one of the original concerns which precipitated the formation of the task force was not yet answered by the paper. The concern was that, if a loss of cooling event occurred near, at, or above rated load, would the time constant of the WTI allow for prompt alarming?

It was explained that the question will be answered in the conclusions section as a compilation of the various sections which contain contributory factors. In summary, winding temperature indicators as a class operate on the assumption that all cooling auxiliaries are operating normally. The WTI will only respond to the inputs it has available. Assuming the load current and oil temperatures are those inputs and the load current has not changed, then the time constant will essentially be that of the oil. In addition, most calculating WTI's adjust the hottest spot gradient based on the number of cooling stages in operation. If the WTI has set its alarms to operate all

cooling auxiliaries and it cannot detect cooling failure it will “believe” that all cooling stages are operating properly and it will adjust the gradient downwards to the rated gradient.

New Business:

It was announced that the task force has been invited to conduct a panel session at the Spring 2003 meeting in Raleigh. We are honored to accept the invitation. The session will cover the major points of the paper from the three perspectives offered. Several prospective panelists were contacted prior to the meeting and they have offered to participate.

The meeting adjourned at 3:15 PM.

Respectfully Submitted, Phil McClure, Chair

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

The Task Force met on Tuesday, October 22, 2002 at 11:00 AM. There were 15 members and 10 guests in attendance.

The minutes of the previous meeting were included in the Subcommittee minutes, and were approved. The Chair noted that the comment concerning rectifier transformers for proposal 2, although correct, would not be applicable to this proposal for C57.12.00.

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

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

- There may be up to 10 to 15% reduced capital cost
- Losses will normally be high but total owning cost is generally lower
- Users in Canada (Manitoba Hydro) as well as transformers built to IEC specifications are in service.
- This type of cooling will apply to transformers with only ODAF cooling and not to ONAN/ODAF cooling
- Transformers with reduced dimensional and weight restrictions will be a benefit from this proposal
- Since the hot spot rise will be closer to the 80°C limit, these transformers may have extra loss of life.
- One member stated that this proposal should not be an optional choice but should be mandatory if it is adopted

A vote to refer the original Proposal 1 to the Insulation Life SC was defeated 10 negative and 2 affirmative

A vote from the members present for a modified proposal (see attached) was taken with 5 in favor, and 5 against. This proposal included several suggestions for revised wording received from the task force members.

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

- The members generally were in agreement that this proposal should proceed
- Comments to modify the proposal to include the word individual and/or separate bushings will be incorporated into the modified proposal.

A vote to refer a modified proposal 2 to the Insulation Life SC for inclusion into C57.12.00 was carried 11 to 1

These modified proposals will be distributed to the Insulation Life SC before the next meeting in Raleigh for a vote when we will discuss the results of the Subcommittee ballot and comments.

There was no new business
The meeting adjourned at 12:15.

Respectfully submitted, Dennis Marlow , Task Force Chair

9.4.4 Old Business

9.4.4.1 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, and was successful with an 87% return and a 99% approval. Mike will be working to resolve the 1 negative, and prepare the document for the standards board.

9.4.4.2 Temperature Rise Tests

The chair reported that there were no new surveys received for the Resistance Correction Factors and procedures for determining cooling curve data. This survey was started as the first step toward implementing a suggestion to standardize the procedures for calculations of the heat run data. In Orlando, we reviewed the requirements in 57.12.90 that say the tester should use a curve fitting program or draw a smooth curve through the data points to determine resistance at time zero. We have established a general consensus that those words are insufficient for inclusion in a standard procedure, and the procedure should be standardized. The new task force will evaluate procedures to develop cooling curve data, and report the resistance at time zero, and revise the procedure to include a standard technique.

George Henry has agreed to lead the new task force to resume work on the test code to incorporate these changes. The task force will have its first meeting in Raleigh.

9.4.4.3 Request for interpretation of C57.100

At our last meeting in Vancouver, a group met to review a request for interpretation of C57.100, Standard Test Procedure for Thermal Evaluation of Oil-Immersed Distribution Transformers. The response will be available to interested members.

During discussions and the preparation of the response, it was apparent that the document will need to be updated, not just re-affirmed, prior to its expiration date of 2004.

After the meeting, Roger Wicks responded to the call for a volunteer to lead the effort. He will establish a working group and hold the first meeting in Raleigh.

9.4.5 New Business

9.4.5.1 Definition of “thermally upgraded insulation”.

Dennis Marlow reported that Phil Hopkinson has forwarded a request from IEC for a definition of “thermally upgraded insulation”. He will determine when a response was requested.

Discussion led to the conclusion that we don't know where to find a definition, and several members agreed to do some research to try to find it.

Jin Sim pointed out that IEC is actually looking for IEEE to provide a definition. If none can be found, then an official definition should be developed.

TV Oomen stated he has reference information, and that from experience he should be able to develop something.

Several members volunteered to collect data to formulate a definition. Some suggested that UL may have a useable definition in either document 1446 or 746.

9.4.5.2 SC Secretary

The chair acknowledged, and introduced, Harry Gianakouros who has agreed to serve as the Secretary of the subcommittee.

9.4.5.3 Loading Guide WG Participation Needed

Don Fallon reiterated his encouragement for members to become actively involved in the work of

the committee, in this case particularly in the Loading Guide working group.

The meeting adjourned at 8:55 AM.

Respectfully submitted by:

Donald W. Platts, Chair Insulation Life Subcommittee

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

9.5.1 Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met at 11:00 A.M. on Wednesday, October 23rd with 68 members and 47 guests in attendance. 18 of those guests requested membership in PCS.

9.5.2 Approval of Meeting Minutes

The minutes of the April 17, 2002, PCS Meeting in Vancouver, BC, Canada were approved as written.

9.5.3 Chairman's Remarks

9.5.3.1 Administrative Subcommittee Notes

Committee Secretary's note: See the individual posting of PCS Minutes on the Committee website (<http://www.transformerscommittee.org>) for full listing of PCS Chair's comments on Administrative SC notes.

9.5.3.2 Membership

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

Raj Ahuja, Waukesha	Van Nhi Nguyen, Hydro-Quebec
Dick Amos, Unifin	Samuel Oriti, First Energy
Carlo Arpino, ComEd	Jeff Ray, Black & Veatch
Florian Costa, Corimpex	Mark Rivers, Doble
Charlie Drexler, KAEC	Steve Schroeder, ABB
Harry Fridman, ELCO Industries	Devki Sharma
Andreas Garnitschnig, VA Tech Austria	Andy Speegle, Kuhlman
Harry Gianakouros, NYSEG	Craig Stiegemeier, ABB
Allen Mitchell, Alstom	Anthony Washington, Southern Co

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.

9.5.4 Agenda Changes

None

9.5.5 Working Group and Task Force Reports

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

The PCS Working Group for Continuous Revision to C57.12.90 met in Oklahoma City, Oklahoma on October 21, 2002 at 11:05 A.M. There were ninety-one persons in attendance, thirty-five members and fifty-six guests. Eighteen guests requested membership in the working group.

The minutes from the last meeting were reviewed and accepted as written. The Agenda was then reviewed and no changes were requested.

Subhash Tuli announced that the balloting for C57.12.90 closed on July 30,2002. He also reported that there were ninety ballots submitted and seven contained negative ballots. The negative comments will be forwarded to the appropriate WG for resolution.

Discussion of Outstanding Issues

The chairman acknowledged that he had not yet contacted the sponsors of requests for changes to clauses 12.4.5, 12.5.4, and 9.3.3.2 for justification, but will do so within the next two weeks.

Old Business

Working Group items 8 through 9 and 11 through 14 were placed on the agenda for discussion and resolution.

After a brief discussion of WG Item 8, “Operational Tests Of All Devices Operated From The Control Box (Not Including LTC Mechanisms)” a motion was made by Don Platts and seconded by Neil Kranich to accept Item 8 as written. The motion passed unanimously.

WG Item 9, “Operational Tests of Load Tap Changers”, was tabled for the next meeting at the request of the chairman to allow resolution of other open items before starting a new issue.

WG Item 11, “Single-Phase Excitation Tests For Class II Transformers” was discussed at length. In reference to the tables, Bertrand Poulin suggested adding a column for watts measurements. He stated that watts should be recorded if the test instrument has the capability for this measurement. He also recommended that a footnote be added to explain the importance of this measurement. Other requested changes included the following:

- 1.HV – Delta Connection table: The table will be rearranged to show a sequence of ABC, as in the other tables. It will also explain that other phase arrangements may exist.

2. It was also suggested to place a note similar to note #8 of C57.12.00 into this item as a cautionary statement for single-phase excitation tests on terminals with relatively low voltage ratings. A voltage limit of 50% of the terminal rating will be recommended.
3. "Class II" shall be eliminated from the title.
4. "For" will be changed to "with" in the proposed tables.
5. In the last sentence of the first paragraph, "importance" will be replaced with "magnitude".
6. The third and fourth paragraphs will be eliminated.
7. A sentence will be added to the second paragraph that will state that the equivalent magnetic and capacitive circuits for the center phase are different than those for the outside phases.
8. A caution shall be added that in order to make accurate measurements, the core must be demagnetized.
9. In section on Equipment Set-up, change "... 60 HZ power supply..." to read "...50/60 Hz power supply..."

WG Item 12, regarding the re-introduction of a test procedure for front-of-wave tests for those who specify such tests, was briefly discussed. It was concluded that this item does not belong to PCS and should be referred to the Dielectric Test Subcommittee. The chairman will send the necessary correspondence to the Transformer Standards Subcommittee to have this item reassigned.

Since time was beginning to run out, the chair requested eight volunteers to review the existing proposals for WG Item 13, which is a proposal to revise the zero-sequence test, and WG Item 14, which is a review of proposed wording for a dissolved gasses in oil analysis test.

The meeting was adjourned at 12:15 P.M.

Follow-up

During the Performance Characteristics Subcommittee meeting on October 23, 2002, a discussion took place regarding WG Item 14. It was concluded that this item does not belong to PCS and should be referred to the Insulation Life Subcommittee. The chairman will send the necessary correspondence to the Transformer Standards Subcommittee to have this item reassigned.

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

The Working Group met on Monday, October 21 at 1:45 PM. There were 28 members and 25 guests in attendance. The following 5 guests requested membership, and are welcomed into the Working Group, bringing the total membership to 61 members :

John Crouse	GE
Malcolm Thaden	Potomac Electric Power
Anthony Washington	Southern Company Services

Sheldon Kennedy
Jeff Ray

Niagara Transformer Corporation
Black & Veatch

Following introductions, the minutes from the April 15 Vancouver meeting were approved as submitted.

A report was received from Subhash Tuli that the C57.12.00 ballot closed on August 2, 2002. 86% of the ballots were returned, 111 affirmative, 17 negative, and 10 abstentions. After resolution of the 17 negatives, the draft will be re-circulated.

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

- 1) **WG item 40**, request to add acceptance criteria and descriptions for the various tests that were added into Table 19 of C57.12.00, 2000 revision. These are : (a) core insulation resistance, (b) single-phase excitation test, (c) low frequency test on the control circuits and auxiliary devices, (d) control (auxiliary) cooling losses, (e) partial discharge test, (f) operational tests of all devices, (g) dissolved gasses in oil analysis, and (h) audible sound level. Items a, b, c, d were addressed at the previous meeting and documented in the meeting minutes.

(e) Partial Discharge Test

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

The Working Group suggested that the acceptance limit for partial discharge should be included in C57.12.00. However, the Dielectric Test Subcommittee should address this issue and make a recommendation as to what should be included in C57.12.00. The chairman will forward this request to DIT.

(f) Operation Test of all Devices

“Note 13: All electrical and electro-mechanical devices such as fans, pumps, motors, LTC, etc., shall be operated both in auto and manual mode for proper sequence/ staging and function.”

The Working Group recommended this to remain as written.

(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 standards under development now that address this issue. Steve Antosz has agreed to review the existing material and activity on the subject and report to the Working Group at the next meeting to determine how we might finalize this point, including recommendations for dissolved gas in oil limits.

(h) Audible Sound Level

“Note 4: The transformer shall be connected for, and energized at, rated voltage, frequency, and at no load. Noise-contributing elements of the transformer, such as pumps and fans, shall be operated as appropriate for the rating being tested. When it is impractical or undesirable to include the appropriate cooling equipment, the self-cooled sound level may be corrected for cooling noise contribution, if suitable corrections are available and it is mutually agreeable to those concerned. Transformers shall meet standard audible sound levels as listed in NEMA Standard TR1, Table 0-1.”

This point was discussed at great length. Many Working Group members felt that the values in the NEMA table were too high, that this information should be included in C57.12.00, and that the table needs to be expanded in scope. The Working Group voted to request of the Audible Sound and Vibration Subcommittee that they pursue obtaining the rights from NEMA to bring this table into C57.12.00. Once the ASV committee has authorization to work on it, the table can be modified as deemed appropriate. For the present time, no changes will be made to C57.12.00. The chairman will officially make this request of ASV.

- 2) **WG Item 42**, request to add a statement requiring liquid volume be shown on the transformer nameplate “A”.

Distribution transformer users were not well represented in this meeting. It was determined we should defer to the Distribution Transformers Subcommittee for their recommendation. The chairman will officially forward this request to Dist.

Nameplate “B” and “C” presently require a breakdown of the weight for the various transformer components, and the oil volume can be derived from the listed weight. Would it also be advantageous to list “Oil Volume” as a new requirement for these two nameplates ?

The Working Group recommended that oil volume is not necessary on these nameplates as the weight is sufficient. The Working Group also noted that oil volume is usually indicated on most transformers using type “B” and type “C” nameplates. No change is necessary.

- 3) **WG Item 43**, it has been reported that note (a) of Table 13, which cites a reference to C57.12.22 – 1989, incorrectly converts 6.25 inches to 165 mm. This should convert to 159 mm.

The Working Group agrees that this is a conversion error and should be corrected as suggested.

4) **WG Item 44**, a request that X/R ratio be shown on transformer nameplates

The Working Group did not think it was appropriate to put this information on the nameplate, as it is available from the information submitted on the test report. The chairman will talk to the requestor to inform him of the WG decision.

There were no other outstanding items of old business, and no new business was brought up before the Working Group.

The meeting adjourned at 3:00 PM.

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

- The chairman expressed satisfaction with the IEC document IEC 60214-1 in all aspects except the missing functional life test. The WG recommended to expand the scope of C57.131 (on-load tap changers) to a new tap changers scope, which would include both on-load and de-energized tap changers. The chairman will be sending material to Bill Henning for inclusion in C57.131.

- Note to Bill Henning: A PAR needs to be developed to change the scope of C57.131 according to decision above.

- This WG will become a task force to develop functional life test(s) to assure contact stability. Members of the TF are Phil Hopkinson, Craig Colopy, Darren Barnett, Bill Darovny, John Tuohy, Larry Dix, Jim Antweiler, Dieter Dohnal, Bengt-Olof Stenestam. This test will then be considered for inclusion in C57.131.

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

The Working Group on Switching Transients Induced by Transformer/Breaker Interaction was called to order at 8:02 AM on October 22, 2002. There were 60 attendees, 37 members, 6 requesting membership, and 17 guests. The agenda for the meeting was reviewed, and the Minutes from the April 16, 2002, meeting in Vancouver, Canada and the October 16, 2001 meeting Orlando, Florida were approved.

1) Results of a meeting Bob Degeneff had with several members of the Switchgear committee in June 2002 were presented. Bob reviewed the efforts of the working group, and consensus was reached on the following items:

- Agreement that interaction can occur.
 - That the guide should be general & describe mitigation techniques.
 - The Switchgear Committee was willing to help quantify this issue.
- 2) The current PAR and outline of the last draft were reviewed relative to the Chicago meeting, and there does not appear to be any conflicts if the guide was to be made more general. Possible next steps were reviewed and a re-write of the guide at a more general level was considered. Plans would be to review it in Raleigh, and then send it to the subcommittee in the fall of 2003.
- 3) The meeting was opened to a general discussion of the above, and to determine a course of action for the working group. Salient points from the discussion were as follows:
- Appropriate content from C37 standards should be used for the guide, but do not contain enough information to form a guide themselves.
 - The consideration of making this a trial use guide versus a permanent guide was proposed since the industry is continuing to learn. Pros and cons of this were discussed, considering the 2-year life of a trial guide versus 5-year life of a standard guide.
 - Several individuals proposed sending the present draft of the guide to the Switchgear Committee for review.
 - The immediate need for a document for the industry was raised, since breaker transformer interactions continue to occur.
- 4) After close of discussion two questions were asked of the working group. The first proposed that the guide could be developed as an either a permanent guide or as trial guide (which would require a new PAR). The majority response of the group was that we should continue to develop it as a permanent guide. The second asked if the guide should be re-written to be more general or tutorial level or should continue with its current level of technical content. The majority response of the group was to continue the guide at its current level and to submit it to the Switchgear Committee for formal review.
- 5) Alexander (Don) Kline made a technical presentation on methodologies for testing transformers and the impact of snubbers. Don described a cost effective methodology to apply surges to a transformer winding. He discussed making use of existing taps in a winding and his observations of the response of the winding to a chopped wave. Don presented waveforms recorded, which displayed winding responses both with and without a snubber, and the impact of the relative location of the snubber. Don suggested that chopped wave tests with adequately steep fronts could be utilized to determine the response of a transformer relative to transformer-breaker interaction phenomena.

- 6) It was indicated that the transformer-breaker interaction problem should not be oversimplified, as the breaker, transformer, and connecting system all contribute to the response of the system, making analysis more complicated.

- 7) Jeewan Puri submitted minutes from the May 6, 2002, CIGRE joint working group Study-committees 12,13, and 23.21, which will be distributed at or before the next meeting. A presentation of our group's progress to date was made at the meeting, and, as a result CIGRE would like to form a joint working group with IEEE. In addition, CIGRE has prepared a paper on this subject, which may provide input to this guide.

There was no other old or new business, and the meeting adjourned at 9:15 AM.

9.5.5.5 Loss Tolerance and Measurement - Ed teNyenhuus, Chairman; Andy Steineman, Secretary

- 12 members and 12 guests attended, with 4 guests requesting membership.
- Minutes from the Vancouver meeting, April 16, 2002, were read and approved.
- It was announced that Andy Steineman accepted the position of secretary of the WG.
- Eddy So reported on the TF meeting for "Guide of Low Power Factor Power Measurements"
 - There were approximately 50 attendees at the meeting, which included a presentation on optical instrument transformers.
 - Eddy So indicated that he had circulated copies of the guide to the testing departments of several manufacturers. Feedback indicated a need to address procedures to maintain loss measurement system calibration.
 - A general discussion was held on questions from the last meeting regarding the use of a single-phase bridge to measure losses on three-phase shunt reactors. It was agreed that some of the ideas discussed should be considered to be included in the guide.
- Report on status of C57.123 Loss Measurement Guide
 - The Guide was approved in June by the Review Committee and is now being reviewed by the IEEE Editorial staff with an anticipated release in November.
- Frequency Conversion Factors of Transformer Performance Parameters
 - It was agreed by the WG that guidelines for measurement should be added to define, for example, whether excitation measurements are to be done at rated voltage or rated flux density when using the frequency conversion factors.
 - The WG discussed the quality of the test data used to verify the proposed conversion factors for no load loss. The WG also discussed whether the factors should be increased so that there could not possibly be an unfair advantage to using conversion factors instead of measuring at the required frequency.
 - The WG acknowledged that, although the emphasis has been on converting measured 50 Hz values to 60Hz, there is probably a need for factors to convert measured 60Hz

values to 50Hz.

- It was agreed by the WG that there be added a note indicating that there will be increased uncertainty in reporting values when using the conversion factors.
- A vote was taken, and it was re-affirmed to continue with the development of frequency conversion factors to be put into C57.12.90.
- A draft of the proposed text of the frequency conversion, including above considerations, will be presented and discussed in the Spring meeting of the WG in Raleigh.
- The meeting was adjourned at 12.15 pm.

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

The PCS task force for the development of a guide for Frequency Response Analysis (FRA) met for the first time in Oklahoma City, Oklahoma on October 22, 2002 at 3:15 P.M. There were forty-six persons in attendance, nine members and thirty-seven guests. Seventeen guests requested membership in the working group.

The following task force members reported on their organization's efforts relative to the FRA technology.

Barry Ward (EPRI) – Barry reported on EPRI's work to develop an on-line method for FRA. EPRI's technique incorporated the use of the bushing capacitance taps for taking measurements during switching operations. Results revealed that this method is possible but that comparison with the other two methods (Frequency Sweep and Low Voltage Impulse) would be difficult. EPRI is working with NEETRAC to compare off-line methods with the on-line method under development.

Larry Coffeen (NEETRAC High Voltage Laboratory) – Larry presented information on NEETRAC's Objective Winding Asymmetry (OWA) method for FRA. He described Spectral Density Estimate software (SDE) and its use in the reduction of noise in the measurement. He also addressed bandwidth considerations and the benefit of higher frequencies' sensitivity to winding distortions. Hardware considerations were also addressed. An impulse voltage of 300 volts and a 10 Ω shunt result in higher peak values in the higher frequencies. Discussion of these issues ensued but due to time limitations, was terminated in order to allow for additional reports.

Jim Fyvie (VA Tech Peebles) – Jim reported on CIGRE's research to assist IEC's efforts related to FRA.

Bertrand Poulin (ABB) – Bertrand discussed his experiences with both SFRA and low voltage impulse FRA. He described how, up to about 500 MHz, both methods compare favorably. He stressed that the measurements must be performed properly in order to assure repeatability.

Charles Sweetser (Doble Engineering) - Chuck presented Doble's draft for Sweep Frequency Response Analysis (SFRA). The format of this document will be examined as a template for the Task Force's draft guide. This document will be sent to members of the TF for additional material. The 1st full draft of the Guide will be ready for review by the TF members at the spring meeting.

For the sake of efficiency in producing a complete draft of the Guide, the chairman of the PCS proposed that during the period of producing this draft of the Guide that only the 14 members of the TF will be invited to attend the work session of this TF. When the work on the document is completed, the TF will be replaced by a WG; where more members can contribute to the discussion of the content of the draft.

After some general discussion of these reports the meeting was adjourned at 4:15 P.M. Charles Sweetser accepted the appointed to co-chair and secretary.

9.5.6 Project Reports

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

The working group did not meet in Oklahoma City.

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

The issue of how to resolve several errors in the document was discussed at the last meeting in Vancouver. Typically, a printing or editorial error is corrected by an errata sheet, while other errors are treated as technical issues and require a corrigenda ballot. Since the printed and draft versions were compared and found to be identical, the IEEE editing staff determined that the errors were technical and must be corrected by ballot.

This ruling was appealed based on the following points:

- The discrepancies were insignificant and the errors occurred in example calculations used for illustrative purposes
- None of the incorrect numbers was elective in nature, but rather the result of a mathematical calculation
- Correcting these mathematical errors would not change the meaning or content of the document in any way

The chairman argued that while the need for procedures and consensus agreement is fully understood in correcting technical issues, the trivial nature of this particular issue warranted correction by an errata sheet rather than ballot. This position was supported by both the chairman of the PCS and the secretary of the Transformers Committee. The IEEE editing staff also agreed and the errata sheet was issued in June.

9.5.6.3 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 reporting

- 5 negative ballots – many due to scanning error at IEEE
- Based on input from R Dudley, Peter Balma sent out letter to 5 negatives asking them to withdraw. The letter addressed specific issues of each negative ballot
- 1 negative was withdrawn
- 1 negative rejected for technical reasons after review by Dry Type Reactor WG
- 3 to be resolved by Peter by phone
- Strategy – complete reaffirmation of C57.21
- Open PAR for revision, address comments from reaffirmation
- Include comments developed by Dry Type Reactor WG for thyristor controlled shunt reactor and switching stressed seen by SR's design and coordination

9.5.6.4 Tutorial – Hydrogen Generation in Mildly Overheated Transformer Cores – Ramsis Girgis and Ed teNyenhuis

The tutorial contained the following items:

- The phenomenon
- Results and analysis of field and laboratory investigations
- Calculation and verification of core hot spot temperature
- Comparison between calculations and actual data on a transformer which was producing H₂ and CH₄ with the right ratio over a 5 period period
- Recommendation for 3 items to be introduced to the ANSI Standards: a) Introducing to C57.12.00 a limit value for core hot spot temperature of 130 C for worst condition of overexcitation at full load and maximum average daily ambient temperature, b) Adding this gas generation signature to the Guide on DGA, and c) Modify the overexcitation specification in C57.12.00 to be limited by the maximum core flux density considering the maximum generator voltage capability at full load for a GSU and maximum system voltage for a substation transformer, and the corresponding minimum tap position of the transformer when applicable.

Subsequent to the tutorial, it was decided by the Power Transformer SC to form a small TF of representatives of Utilities and transformer manufacturers to discuss proposed changes to C5712.00. The chairman of the PCS will submit a formal request to the Insulating Fluids SC chairman to include the new Gas generation signature in the DGA Guide.

9.5.7 Old Business

None discussed

9.5.8 New Business

- Ernst Hanique pointed out a conversion error in C57.91, clause 7.25?. Don Platts said this was noted before, and corrigenda went out to the Loading Guide by Lin Pierce, correcting the error.
- Bertrand Poulin pointed out a problem regarding overexcitation requirement in C57.12.00. 105% on the secondary is an unrealistic operating condition since this would mean 110-115% on the primary. This can be designed for, but adds extra cost to the transformer to meet a condition that may never occur.
- Subhash Tuli submitted that there is an error in C57.12.00, Clause 7.1.2. Transformer Categories I and II refer to the kVA range 15-500 kVA and 501-5000 kVA, respectively. These should be 15-1500 and 1501-5000.
- Chairmen of Performance Characteristics SC, Insulation Life SC, and Insulating Fluids SC should decide which SC should take on the Core Hot Spot Standards issue.

9.5.9 Next Meeting

Time expired and the meeting was adjourned at 12:15 P.M. The next meeting is scheduled for March 19, 2003, in Raleigh, NC.

Submitted by Ramsis Girgis / Steve Antosz

9.6 Power Transformers – E. G. Hager, T. Lundquist, Co-Chairs

The Power Transformers Subcommittee met Wednesday afternoon at 1:30 pm with 45 members, 9 new members and 56 guests in attendance.

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

9.6.1 WORKING GROUP AND TASK FORCE REPORTS

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

Bill Bartley reported for Dom Corsi and Robert Ganser. The meeting was called to order at 9:30 am. There were 20 members in attendance. Of these members, there were no Arc Furnace transformer users represented. The minutes from the Vancouver meeting were approved.

Prior to presenting the Agenda, a brief general discussion concerning the purpose of the Task Force and background information relating to AC Arc Furnace Transformers was held by the members. Frank Damico reported that there were no specific IEC standards addressing AC Arc Furnace Transformers.

He references IEC 60599 for DGA analysis.

Dom Corsi then presented the Agenda, which included the following major sections:

- Greetings and introductions
- Proposed content page
- Proposed scope of the document
- PAR discussion
- Adjourn

Dom Corsi then presented the proposed content page, which included the following major sections:

- Scope
- Ratings
- Insulation Levels
- Impedance Voltage
- Connections
- Testing
- Construction
- Short Circuit Characteristics

The members recommended that the Scope, as presented, be changed to reflect the following:

- Retain the “Indoor” application description
- Change “oil” to “liquid immersed”
- List the voltage as 69kV maximum, but not the limit
- Remove the 2000kVA as a lower limit

The Ratings and Insulation Levels were accepted as proposed

Discussion concerning the Impedance Section resulted in the inclusion of the consideration and specification of impedance of the furnace transformer at the terminals of the transformer and at various reactor configurations, if so required. This discussion also emphasized the importance of the lead reactance in the ultimate performance of the transformer.

The Construction Section is to be opened to include Load Tap Changers, DETC switches and other switches that are specific to the AFT operation.

The members contributed readily to the items in the Agenda, which will form the basis for revision and study. The meeting adjourned at 10:45 am.

9.6.1.2 Task Force on a Guide for Standard Control Cabinet Designs – Joe Watson, Chairman

Joe Watson reported that the task force met at 11:00 am on Monday, October 21, with 42 in attendance. There were 19 members and 23 guests. Three of the guests requested membership.

Initial discussions centered on the upcoming survey of users concerning their requirements for control cabinets. Joe had received two emails identifying several areas of concern: grounding the cabinet, thermal shields, circuit breaker ratings, protecting all devices, permanent labels, flex conduit problems, wire marking, and cooler control standards.

It was then brought up that a standard already exists for switchboard wiring, C37.21, and that the task force should look at the document and determine how best to use it for our needs. Joe will email the draft to members.

Several items were brought up as additions to the survey: non-GFI outlets, lifting provisions for heavy doors, and removable rear panels.

The group then discussed the survey feature list, including:

- NEMA 3R or 4 – Type 4 cannot have opening in the box
- Louvered openings – add other types of openings
- Conduit plates – add knockouts
- Lamp inside – add option for guard, and door-operated switch
- Heaters – add options for cover / shield
- Circuit Breakers – add options for voltage and interrupting current options
- Splicing – add option for no splices buried in conduit
- Wiring – remove “cross-linked polyethylene (SIS type)”
- Stranding – add
- Wire Terminals – add information concerning where ring-tongue terminals must be used. Also, add DIN rail mounting option.
- Wiring – add option for wiring in transformer braces
- Conduit – add option to run short piece of flex conduit to gauges

The survey will be emailed to task force members one more time for additions and corrections, and then Greg Anderson will send the survey out to users.

The meeting adjourned at 12:20 pm.

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

William Henning reported that the Working Group on Load Tap Changer Performance met on Monday, October 21 at 1:45 pm with 13 members and 31 guests attending. The minutes of the April 15th meeting were approved.

The Working Group addressed the business of resolving three negative votes on the electronic ballot for the reaffirmation of C57.131-1995, “Standard Requirements for Load Tap Changers.” The first negative vote concerned errors in the text of Sections 6.4.1 and 10.3.1 and the Tables A.2, B.2 and

B.3 of C57.131-1995. These issues are clearly errors and will be corrected in the next revision of the Standard. A PAR for that work is being prepared.

A Working Group member who was not present at the meeting cast the second negative vote. He will be contacted after the meeting to discuss resolution of his concerns.

The third negative vote raised five separate technical issues, each of which will require more consideration by the Working Group than was possible in this meeting. A motion was passed to consider these changes in the next revision. The negative voter will be contacted regarding these issues.

The meeting was adjourned at 3:00 pm.

9.6.1.4 Working Group on C57.140 “Guide for the Evaluation and Reconditioning of Liquid Immersed Power Transformers” - Rowland James, Chairman.

Rowland James reported that the working group met at 3:15 PM on Monday, October 21, 2002 with 72 in attendance. There were 38 members and 34 guests-23 requested membership.

After introductions a brief discussion of the latest draft's status was held. The Chair reported that the efforts of the group so far have placed the draft ahead of schedule.

Discussion from the floor

- Phil McClure will add information in Oil & Winding temperature on calibration of gauges and also information on the new generation of digital and analog meters available.
- Stan Lindgren commented on vintage (Section 5 –Risk). He stated that thermally upgraded paper became available in the 60's not the 70's.
- Tom Bassett will add information in 4.1.4, 6.1.4 and 6.1.12 on molecular sponges (as an alternate to conventional drying techniques).
- Jeewan Puri posed a question on the direction/scope of section 4.1.16 “Noise and Vibration”. He will work with Bill Chiu on a brief article.

Numerous Volunteers were obtained for incomplete sections:

- Radiators Fans & Pumps - Stephen Antosz (Mike Havener has already written this)
- Bushings - Bob Hartgrove (completed during meeting)
- LTC's - Van Nhi Nguyen and Carlo Arpino
- Infrared - Paulette Payne
- Conservators (COPS) - Mostafa Jafarnia and Robert Thompson
- Gas Blanketed Systems - Robert Thompson
- Noise and Vibration - Jeewan Puri
- Gaskets - John Matthews
- Internal assessment of Bushings - Carlo Arpino
- Oil & Winding Temperature Gauges-Phi McClure (expansion of existing article)
- Maintenance of Leads - Tommy Spitzer

- Molecular Sponge - Tom Bassett

The meeting was adjourned at 3:50 PM.

9.6.1.5 WEST COAST WORKING GROUP - Michael Lau, Chairman

Michael Lau reported that the West Coast Working Group met on Tuesday, October 22nd at 8:00 am with 5 members and 6 guests present.

After introductions, the Chairman pointed out that there is no active assignment for the Working Group at present. Discussion was carried out on two potential projects that were identified at the last meeting in Vancouver:

Development of a Users Guide on seismic considerations for transformer designs
Transformer shipping requirements and similar considerations

After much discussion, it was agreed that a supplementary Guide to the existing Substation Seismic Guide, IEEE 693 would be a worthwhile project for the Group.

The meeting adjourned at 9:15 am.

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

The Working Group on Transformer Monitoring met on Tuesday, October 22, 2002 at 9:30am. Approximately 14 members and 68 guests were in attendance. 19 Guests requested membership in the WG. There were also numerous requests for copies of the draft.

The meeting was presided over by William Bartley in the absence of the Co-Chair. Minutes of the previous meeting were not available.

Status of the Guide is 99% complete. Mr. Lux is in the midst of an arduous editing process to achieve a seamless and cohesive Guide.

Mr. Tom Prevost explained the On-Line editing tools available from the IEEE and the IEEE balloting process.

The floor was open for questions on the Guide; but there were none. The meeting adjourned at approximately 9:50am.

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

Michael Lau reported that the Working Group on The Installation of Liquid-filled Transformers was called to order at 11:05 AM on Tuesday October 22, 2002. There were 59 attendees, 19 members, 8 requesting membership, and 34 guests. The agenda for the meeting was reviewed, followed by approval of the Minutes from the April 16, 2002, meeting in Vancouver, Canada. The minutes, a new draft of the guide, and copies of the overheads presented were distributed.

The PAR for revision of the guide was approved on June 13, 2002 as PC57.93, and the scope and purpose of the working group as submitted on the PAR were reviewed.

The present format of the document was reviewed, and a suggested alternative format was also presented for discussion. Alternatives considered changing the size of the transformers contained in the guide, and the clause structure of the guide itself. Various viewpoints were expressed, however, it appeared it was too early in the document review process to consider format changes. Salient points of the discussion were as follows:

IEC considers three classes of transformers, which might provide assistance in this guides format.

- Requirements for a 500-kva unit versus a 1000 MVA unit are too diverse to be merged; several different clauses will be required to distinguish the two.
- Small transformer users are looking for guidance, as well as those utilizing the largest transformers manufactured.
- Installation requirements for transformers shipped oil filled have substantially different installation requirements from those that are shipped dry.
- Should the guide consider both old and new transformers; wouldn't the methodologies described in the guide be the same?

Another discussion developed during the meeting suggesting a change to the title of the guide to include maintenance, specifically since it was discussed within the present document. Various viewpoints were presented and considered whether maintenance should be in the document at all; implications to insurance companies and regulators if the guide was too prescriptive; and consideration that the majority of users have their own maintenance guidelines. Moreover, several indicated some guidance was needed as some users do not have maintenance practices, and that the current PAR does describe maintenance as part of the scope of this guide. A vote was held at the end of this discussion and the working group decided it should be included in the title and the document. A revised PAR will be submitted to reflect the title change.

- Review of the document was started with Clause 4.2, Shipping. Changes were reviewed and the following items were suggested.
- Impact recorders should be placed on rail cars in addition to those placed on the transformer.
- The need for a caution statement if a transformer is shipped nitrogen filled; how such a unit should be handled; and that vacuum may be need to remove the nitrogen.
- Consistency of the statements relative to shipping units filled with nitrogen, are needed in Clauses 3

and 4 of the document.

- Long distance and/or duration shipments of transformers may require external gas bottles and controls to insure positive pressure is maintained throughout the shipment.

Coordination of this working group with the working group on transformer life extension will be needed to avoid duplication of efforts.

Additional volunteers were requested to re-write several sections of the guide. New volunteers were as follows:

- | | | |
|---------------------|----------------------------|------------------|
| - Clause 1, & 2 | Scope & Reference | Malcom Thaden |
| - Clause 3.9 | Maintenance | Marcos Ferreira |
| - Clause 4.7 | Assembly | Dan Perco |
| - Clause 4.8, 4.8.4 | Vacuum treatment | Derek Baranowski |
| - Clause 4.9 | Field drying of insulation | Derek Baranowski |
| - Clause 4.13 | Maintenance | Paulette Payne |

In addition Ron Daubert and Alan Peterson volunteered to provide general assistance.

Paulette Payne has been providing coordination between IEEE and Doble for this working group, and provided an update on Doble's progress on an oil-processing guide. Doble is working on a multi-section guide, and currently transformer filling is being discussed. Doble would like input from IEEE in this area. A discussion by the working group stressed the need to follow manufacturers directions when filling a transformer. Paulette indicated that would still leave a gap for older transformers without instruction books, especially if the manufacturer is no longer in the market.

There was no other old or new business, and the meeting adjourned at 12:15 PM.

9.6.1.8 WORKING GROUP FOR REVISION OF C57.12.10 - Javier Arteage, Chairman

The Working Group met at 3:15 pm on Tuesday, October 22nd with 13 members and 27 guests present. 15 of the guests requested membership in the Group. The minutes from the Vancouver meeting were approved as written.

Since the Vancouver meeting, the PAR's for both C57.12.10 and C57.12.36 have been approved. The scope of C57.12.10 was modified to include ratings below 5 MVA to satisfy NESCOM concerns.

Regarding review of the specific sections of the current draft, the following items were discussed:

Ratings: The Scope of the PAR does not have an upper limit with respect to the ratings. Therefore, all of the existing tables need to be opened up to cover all possible sizes. There was much debate as to whether or not Tables should be used. One reason to keep the Tables is to provide users the ability to fall back on the limits provided in a Standard. After much debate it was decided to eliminate the rating Tables wherever possible and refer to C57.12.00. This decision also applies to the BIL Tables.

Impedance: For now, the impedance Table will remain in the Standard. Raj Ahuja volunteered to gather information and fill in the remainder of the Table. He will also contact Loren Wagenaar for input.

- Taps: A suggestion was made to clarify the de-energized tap switch application – “should be used for incoming line adjustment, not secondary regulation.” This may belong in an Application Guide, instead, or possible included in C57.105.
- Taps for LTC Transformers: A suggestion was made to add information to regulate the high side along with the low side and use IEC 60606 as a guide. Since there weren't any volunteers to write this section, some statements will be circulated to the Working Group for review and comment. The addition of the information will impact the LTC section compiled by Jim Harlow.
- Top Liquid Temperature Range Limits: We will add a statement that the temperature range stated is for normal operating conditions. We will consider removing the note that the pressure/vacuum bleeder may operate since a sealed tank should remain sealed.
- Construction (Section 5.0): Direct mounted devices will be limited to no higher than 96” and remote mounted devices will be used above 96”. A suggestion was made to limit the distance the top liquid temperature well is below oil to 12”. The statement that was previously added regarding locating the tap switch such that operators can change safely without a ladder will be removed.

Any additional feedback will be incorporated into the document and re-circulated.

The meeting adjourned at 4:30 pm.

9.6.2 OLD BUSINESS

Tom Lundquist reported that the Guide for Phase Shifting Transformers, C57.135 has been issued and is available for use.

9.6.3 NEW BUSINESS

Tom Lundquist also initiated a discussion on Section 4.1.6 of C57.12.00 that specifies that transformers shall be capable of operation at 105% of the kVA rating at a 0.8 power factor under full load and 110% of the kV rating under no-load. It was noted that there has been considerable discussion of this requirement recently and it was agreed that a tutorial on the subject would be beneficial. A Task Force, headed by Bipin Patel, was volunteered to put this tutorial together for presentation at the next Committee meeting in Raleigh.

Zalya Berler gave a presentation on methods to perform capacitance and power factor tests on bushings, current transformers, CCVT's and similar equipment on-line. The method is widely used in the Ukraine and Russia and similar systems have been installed in the past year in Canada and the US. The presentation will be posted on the website.

The meeting adjourned at 2:45 pm.

Submitted by: Joe Watson, Secretary

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

9.7.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met on Wednesday, October 23, 2002, in Room 20 of the Cox Business Services Convention Center at 9:30 AM with ten members and three guests present.

9.7.2 Approval of Minutes

The minutes of the April 17, 2002 meeting in Vancouver, B.C., Canada were approved as submitted.

9.7.3 Membership

Membership stands at 20 members.

9.7.4 Chairman's Remarks

Administrative Subcommittee Notes Reported to SC

- Attendance at meeting is 286 registered and 37 companions.
- The subcommittee was informed that according to Sheldon Kennedy, The NEMA Delegation had voted to inform NEMA it was their recommendation to turn the writing of transformer standards over to IEEE.
- IEEE "C57 Phonebook", available in CD format at this meeting.
- 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.

9.7.5 Working Group Reports

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

No report, did not meet. Group met in general session to discuss the MOU and metrification issues.

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

1. Met on Monday, October 21, 2002 at 11:00 AM with 11 members and four guests present.
2. Minutes of the April 15, 2002 meeting in Vancouver, B.C. Canada were approved as submitted.
3. The WG discussed the metrification issue. The Chairman stated that although we were ready to go to a final draft and a ballot, this will not proceed until there is clear direction on metrification. This WG wishes to work with the dual measurement method, but recognize that this probably will be rejected by the IEEE. We await the results of C57.12.34 and the ultimate direction from the Main Committee.
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.
5. It was decided to use the rest of the meeting to start the next revision to the standard with an objective of a 2005 publishing date.
6. The discussion started with a general discussion on the former Part II of this standard that used to be included for Con-Ed. 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.
7. Review of the current spec started with the following notes:
 - (a) Need for a poll of manufacturers to check usage of 150 kV BIL at 35 kV versus 200 kV BIL at 35 kV.
 - (b) Loss tolerance for orders of more than one unit may have to be discussed further.
 - (c) The network primary switch requirements need clearer definition. Larry Dix will document a proposal on the HV switch for this WG to discuss at the next meeting.
8. The meeting was adjourned at 12:15 pm

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

1. Met on Monday, October 21, 2002 at 3:15 PM with five members and three guests present.
2. Minutes of the April 15, 2002 meeting in Vancouver, B.C., Canada were approved as written.
3. The WG reviewed six added or revised sections of C57.12.44 D1.3. The following changes were made:
 - A. Revised 7.2.1 “Dead Network Close Function” to include “80% of rated voltage” to match minimum voltage close characteristics.
 - B. Revised 7.3 “Automatic Trip Functions” by correcting spelling of the word “planned”. The remaining portions of section 7 were approved as submitted.

- C. Revised 10.5.18 “On network breakers” was changed to “On network protectors”. Sections 10.5.17 and 10.5.18 were approved as written and /or approved with changes.
 - 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. It was suggested that Dan Mulky survey the Network Protector and Network Transformer manufacturers to determine what dimension should be used.
 - E. Changed Annex Table B.3, Alloy Fuse, and Table B.4 Silver-Sand Fuse to include the Richard’s Manufacturing style numbers. It was brought up that the Silver-Sand Current Limiting fuse write-up needs to include a statement concerning let-thru currents and their impact on network protector withstand ratings. Jock Moffat agreed to submit this addition.
 - F. Discussion was held on the need for Table 4 (Type 2) breaker ratings and that it should be removed from the standard, as well as the BIL section. This was tabled will be on the agenda for the Raleigh, NC meeting.
4. Next meeting will be held in Raleigh, NC on March 16-20, 2003.
- A. Two working group sessions are required for the next meeting.
5. The meeting was adjourned at 4:30 PM.

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

1. Introduction/Attendance

The working group met on Monday, October 21, at 2:00 p.m. in Room 21 of the Cox Business Services Convention Center, Oklahoma City, Oklahoma, with four members and three guests in attendance.

2. Approval of Minutes

The minutes of the meeting in Orlando, Florida, were approved as published. No meeting was held in Vancouver, BC.

3. Old Business

The Chairman routed a copy of the current roster and asked each attendee to verify their e-mail address since that will be the primary mode of future communications.

The working group Chairman reported that the revised standard had been submitted to NEMA for balloting and it had been approved. However, it has not and probably will not been published by NEMA.

There was discussion as to the need for this standard. It was originally developed as an alternative to PCB filled network transformers. Manufacturers of dry type transformers will be polled to determine if this type of network transformer is still being built.

Discussion followed as to the next step. Since the document is ready for publication and would only need to be revised to meet IEEE metrification standards, it was decided to submit a PAR to receive IEEE authorization to begin the process.

4. New Business

Hemchandra Shertukde volunteered to be the working group vice-chairman.

Three new members joined the committee. The Chair welcomes Art Diem, Hemchandra Shertukde and the return of Paul Orehek to the committee.

5. Next Meeting

The next meeting will be in Raleigh, N.C., on March 16-20, 2003.

6. Adjournment

The meeting adjourned at 2:15 pm

9.7.6 New Business

- 1) Discussion on removal of metric units from standards. Subcommittee is in favor of dual unit system. The Underground Transformers and Network Protectors Subcommittee voted to adopt a position statement It reads as follows

The Underground Transformers and Network Protectors Subcommittee supports metrification on our product standards, however, we strongly recommend, for safety reasons, that for the foreseeable future our standards retain the dual unit system.

CLARIFICATION

By foreseeable future we mean that until such time that the work forces are fully conversant with metrification. Also, we are not in favor of putting U.S. Customary units in footnotes or appendices.

- 2) Discussion on withdrawal of MOU for co-copywrite with NEMA. Will wait to see what action NEMA takes on the recommendation of the NEMA Delegation to turn over writing of Standards to IEEE.

9.7.7 Future Meetings

The location and dates for future meetings are as follows:

March 16-20, 2003 Raliegh, N.C.

October 5-9, 2003 Pittsburg, PA

9.7.8 The Subcommittee adjourned at 10:45 AM.

Submitted by Carl Niemann, Chair

9.8 Audible Sound and Vibration SC – Jeewan Puri, Chair

9.8.1 Introduction and Chairman's Remarks

Audible noise & vibrations S.C. met at 8:00 a.m. with 7 members and 10 guests present. Three new members were welcomed to our subcommittee.

The minutes of our April 16 meeting in Vancouver, Canada were approved as submitted.

During the Chairman's remarks, Jeewan Puri reported that the working group for revising the test procedure for making sound level measurements using sound intensity and sound pressure measurements had completed this task. This procedure will now be submitted for inclusion in the test codes C57.12.90 and C57.12.91 as Section 13 for liquid filled and dry type transformers.

9.8.2 Report - WG for writing "Sound Level Measurement Guide"

Jim Nielsen; the Chairman of the WG for writing "Sound Level Measurement Guide" could not attend this meeting for personal reasons. In his absence, Jeewan Puri conducted this meeting. This WG met on Tuesday October 2 at 3:15 p.m. with 6 members and 13 quests present. Eight new members were welcomed to this working group.

The working group started the project for writing a sound level measurement guide using IEC 60076-10-1 as a reference document.

Jeewan Puri presented a detailed overview of the IEC 60076-10-1 Sound level measurement guide to the working group. The general content and the style of this document was reviewed.

It was agreed that Jeewan Puri will obtain a word version of this document and circulate it as Draft 1 of this document and obtain comments from the working group members. These comments will be discussed in the next WG meeting.

9.8.3 New Business:

Mr. Jessie Patton made a brief presentation on using sonic and ultrasonic vibration measurements as a diagnostic tool for transformers.

Mr. Bill Chu presented sonic and ultrasonic vibration measurements made on a transformer before and after tightening the transformer windings.

The subcommittee recognized that using transformer vibration pattern as a diagnostic tool is indeed an interesting subject. However, additional expertise will be needed to pursue this topic in the future. Messrs. Alan Darwin, Jessie Patton and Richard Dudley agreed to collecting technical papers and measurement data for further evaluation of this topic by this subcommittee.

The meeting adjourned at 9:15 am.

Jeewan Puri

October 23, 2002

9.9 Bushings SC – Fred Elliott, Chair

9.9.1 Introduction and Membership

Subcommittee Chairman, Fred Elliott opened the meeting at 3:00 PM and welcomed the members and guests. Introductions were made and an attendance lists was circulated. There were 44 people in attendance with 19 members and 25 guests present. One guest requested membership.

9.9.2 Chairman's Remarks

Fred explained the procedure for balloting documents within IEEE: In order to vote you must become a member of a ballot pool. This requires that you first must request to be made a member of the balloting pool. Once you are a member of the balloting pool you will receive invitations to ballot via email. If you do not want to ballot the particular document, do not respond to the email. If you want to ballot the particular document follow the instructions in the email. Once you respond you must vote or be removed from ballot pool.

In order to become a member of a ballot pool you must be a member of the Standard Association. (And likely a member of IEEE)

Fred announced that next Transformers Committee meeting would be held in Raleigh, NC March 16-20, 2003.

Fred confirmed that Russ Nordman, a long time Bushing Subcommittee, member had changed employers and would not be able to continue to attend our meetings. Fred read a short farewell note from Russ.

9.9.3 Approval of Minutes of April 16th, 2002 Meeting in Vancouver BC

The minutes were approved as written.

9.9.4 Working Group / Task Force Reports

9.9.4.1 WG on General Requirements and Test Procedure For Power Apparatus Bushings (C57.19.00)

Introduction and Membership

The WG Chair opened the meeting at 1:55 PM and welcomed the members and guests. Introductions were made and an attendance list was circulated. There were 29 people in attendance with 13 members and 16 guests present.

Meeting Minutes

The minutes from the last meeting in Vancouver BC were approved.

Review the status of the ballot of PC57.19.00/D6.

As of Friday, October 18th there were 23 ballots received out of 89 members of the ballot pool. With 19 approved without comment, 3 approved with editorial comments and 1 abstention. The ballots close November 13, 2002.

The WG Chair reported that the PAR for this document expires at the end of the year, making it impossible to complete the work before the PAR expires. A second PAR extension has been requested. It is planned to complete all work on this document before the Spring 2003 meeting in Raleigh. So there will be no additional WG meetings scheduled.

The WG Chair requested that during the ballot process he might call on individual WG members for their assistance in resolving ballot comments.

The WG Chair thanked all WG members and Guests for their contribution, over the years, to the revision of this most important document.

One item that came up was regarding the SA ballot process. It appears that a number of WG members, who are SA members, did not receive invitations to ballot this document. This even though they had requested SA to be invited to ballot all C57 documents. It was agreed to bring this issue up during the Bushing Subcommittee meeting on October 23rd.

An additional comment by the WG Chair regarding the entire process to bring a document to ballot: The entire process was too long and the Chair received little to no assistance from IEEE in the

process. It appears to the Chair that IEEE is forgetting that we volunteer our time to IEEE and that we all have full time employment to consider. A response from IEEE such “we are too busy” or “we get too many emails” are not acceptable responses to people who are volunteering their time and effort to IEEE.

Additional Discussion

With the additional time available during this session it was agreed to discuss forming a Study Group to oversee the revision of C57.19.100, Bushing Application Guide. During the past several years a number of items and issues had come up that were suggested for the Guide. In addition, a survey was taken earlier that indicated a number of areas in the Guide that needed revision. In order to get a jump-start before forming a WG, which requires a PAR, it is suggested to form a Study Group? The people present voted on this suggestion and the vast majority voted in favor of forming a SG. The results of this vote will be presented to the Bushing Subcommittee members. After the meeting Tommy Spitzer with Oncor volunteered to chair the SG.

New Business

There was no new business

Adjournment

The meeting was adjourned at 2:22 PM.

9.9.4.2 Task Force on Draw-Lead Bushings

Fred Elliott chaired the TF on Draw-Lead Bushings. During the meeting the questions was raised regarding the future of the group: Should the TF continue or has it exhausted its efforts to recommend any positive results to the Subcommittee. After some discussion and a show of hands the majority of the people in attendance voted to disband the TF.

Discussions on this subject continued in the Subcommittee. There were a couple of people that felt that some of the work of the TF had produced some information that could be used in C57.19.100, Bushing Application Guide and possibly in other documents. It was agreed to tabulate the efforts of the TF over the past seven years and present those results to the Subcommittee for review. Keith Ellis or Fred Elliott will contact Russ Nordman to gather this information.

9.9.5 Report from Technical Advisor to IEC 36 A

As Russ Nordman filled this function the Subcommittee is looking for a volunteer to become the Technical Advisor to IEC 36A. Please contact Fred Elliott if you are interested in supporting this effort.

9.9.6 Old Business

Fred Elliott needs to produce a possible scope for looking into developing a standard for bulk type bushings up to 34.5 kV and then put this scope into the hands of the individuals who volunteered to work on this effort.

9.9.6.1 Reaffirmation/Revision of C57.19.100, Bushing Application Guide

Based on the discussions during the PC57.19.00 meeting as reported above it was agreed to form a Study Group to start work on the revision of this document. Tommy Spitzer with Oncor volunteered to head the Study Group. Keith Ellis and Fred Elliott are to provide Tommy with supporting information on items that needed to be added or revised in this document.

9.9.6.2 C57.19.03, DC Bushing Standard

During the reaffirmation ballot a number of comments and one negative vote was received. After review of the comments it was clear that certain clause references of the original document are in error. It is planned to address these comments by confirming that the errors will be corrected and that other comments will be addressed in the next revision.

9.9.7 New Business

The PAR extension for PC57.19.00 has been submitted and it looks like it will be granted.

9.9.7.1 C57.19.01, 2000: Performance Characteristics and Dimensions for Outdoor Apparatus Bushings:

Fred Elliott reported that there are a number of people that have expressed concern with the major changes made to this document in 2000 and that reaffirmation of this document in 2005 would most likely be difficult. Discussion on this issue resulted in agreement to take a couple of actions:

1. Publish a paper explaining the efforts that went into developing this standard. The paper will be considered for publication at the next Doble Conference.
2. Conduct a tutorial at a future Transformers Committee meeting to educate everyone on the benefits of this standard.
3. Form a study group to look into improving this document for the next revision.

9.9.8 Adjournment

The meeting was adjourned at 4:11 PM

Minutes Submitted By, Keith Ellis, Acting Secretary, Bushing Subcommittee

9.10 Dry Type Transformers SC – W. F. Patterson, Jr., C. W. Johnson, Jr., Co-Chairs

(Presented by Paulette Payne)

9.10.1 Chair Remarks and Announcements

The Dry Type Transformer Subcommittee met at 1:30 PM on October 23, 2002 with 12 members and 8 guests present; 5 guests requested membership. Paulette Payne chaired the meeting. Introductions were made and the attendance roster was circulated. Minutes from the April 17, 2002 meeting were reviewed and approved.

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

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.

9.10.2 Working Group Reports

The next order of business was the presentation of the reports of the various working groups.

9.10.2.1 Working Group on Dry Type Reactors, Chair: Richard Dudley

The Dry Type Reactor W.G. met in Meeting Room 15 of the Cox Business Center in Oklahoma City, Oklahoma on Oct. 21, 2002 from 9:30 a.m. to 12:00 noon. There were 7 members and 3 guests present. Two of the guests requested membership. The following are the highlights of the meeting.

1. The minutes of the Vancouver meeting were approved.
2. Peter Balma made a presentation on the status of the reaffirmation process for C57.21. Current focus is on the resolution of 5 negative ballots. Peter has prepared a letter response to the negative balloters incorporating input from Richard Dudley's review of the negative ballots. A number of the negative ballots were based on the significant number of OCR based errors resulting from IEEE's scanning of the document. There were also more substantive reasons for some of the negatives. The letters basically asked the negative balloters to withdraw their negative ballots based on IEEE correcting the OCR errors and a promise to address the valid substantive concerns during the next revision process. A PAR will be raised in the near future

after completion of the reaffirmation. One balloter has withdrawn his negative on the above basis. Peter will follow up with phone calls to the remaining four.

Pierre Riffon's general comments and comments to the negative ballots were discussed.

- (i) In the next revision of C57.21 Pierre thinks that the document will be clearer if there is only a single table of voltage insulation levels for oil immersed and dry type shunt reactors. Test code can be design specific but dielectric test levels should be common.
 - (ii) The mega volt-ampere rating is printed as mVA and not MVA. Can this obvious error be corrected as it is in the same category as a spelling error. Is a PAR required for a corrigenda? Is it more effective to raise a PAR for a full revision once the document is reaffirmed? The error has been in the document for 12 years. Is it serious enough to warrant immediate action? The consensus is that it is not.
 - (iii) Can obvious editorial changes be made? It is assumed that the OCR based problems can be corrected.
 - (iv) The negative ballot of Carlos Piexoto based on the premise that there should be different LIWL and SIWL for dry type SRs vs oil immersed reactors was recommended to be rejected. LIWL and SIWL levels should only be based on system requirements and insulation co-ordination practice.
 - (v) Ramon Garcia's comments should be considered during the next revision process with the exception of including wording on laboratory limitations. Shunt reactors must be tested to specification and appropriate investment in test equipment should be made. This is essential for reliable functioning of shunt reactors in the power system.
 - (vi) The appropriate voltage level (100% or 105%) at which to carry out sound level testing will be discussed during the next revision process.
3. Draft #4 of Annex A covering thyristor controlled shunt reactors was reviewed. Pierre Riffon's comments were reviewed. His editorial comments and clarifications were accepted.

The following are key points that were discussed.

- (i) A reference will be included on the affect of capacitance to ground on the di/dt seen be the thyristor; one coil vs two coils per phase.
- (ii) To simplify calculation of losses in TCRs at various SVC operating points a preferred reference temperature, such as 75°C, may be used.
- (iii) The consensus of the W.G. was that the work on Annex A was complete. The W.G. and perhaps the PC S.C. should be balloted to obtain input. The objective will be to ballot a group that has the highest level of interest in the subject matter of this annex. The chairman will raise the subject at the PC S.C. and Dry Type Transformers S.C. meetings.

4. Draft # 3 of Annex B covering dielectric stresses imposed on shunt reactors during switching was reviewed. The following are the highlights.
 - (i) The focus of the annex should be on how to specify the dielectric capability of SRs for the highly repetitive switching operations to which they are typically exposed. The circuit breaker and shunt reactor combination should not impose stresses on the SR beyond a specified value; maximum value that the SR should withstand.
 - (ii) The annex will present general methodologies for calculating the stresses imposed on SRs by CBs and what can be done to mitigate or reduce the stresses such as damped capacitor networks (possible solution that needs to be evaluated).
 - (iii) A draft of Annex B should be sent to the Switchgear and Protective Devices Committee for input; timing of the submittal needs to be determined. The PAR that will be raised to revise C57.21 should request co-ordination with the CB S.C. Input from the CB S.C. should include; objectivity of annex re CBs, evaluation of CBs for SR switching (annex should not recommend), correctness of CB evaluation process, etc.
 - (iv) Pierre Riffon's comments on Draft #3 were discussed and were accepted with only minor changes required in some cases. Since Annex B is to be informative "should" and "could" will be used vs "shall" and "will". References to voltage class will be numerical and not by descriptors such as "high" and "extra high".
 - (v) Input is required for B.6 of Annex B on maximum switching transient overvoltages that shunt reactors should be exposed to as a % of BIL and SIWL. It should be guaranteed that the installed shunt reactor should not be exposed to higher numbers and the shunt reactor should be designed to withstand the repetitive nature of switching transients overvoltages of these values.
5. A discussion of references in C57.21 took place. The W.G. felt that the valid reference is the date referenced document and not the latest version. The document referenced when the standard was published is the valid reference. This is critical for a number of issues; specificity of referenced information, testing methodology and test levels, safety, etc. What does the IEEE Style Manual require? A comment could be made in the references section; "referenced edition" or "latest edition if applicable". The chairman stated that he would bring this subject up at the PC S.C. and Dry Type Transformers S.C. meeting and main committee meeting.

The W.G. meeting adjourned at 12:00 noon.

9.10.2.2 Working Group on Dry-Type Test Code - C57.12.91, Chair: Mr. Dave Barnard

The working group met at 1:55 pm with 6 members and 6 guests present. Five guest requested membership. After introductions the chairman asked for comments and/or corrections to the minutes from the Vancouver, BC meeting. There being no comments Don Kline moved and Rick Marek seconded to accept the minutes as written. The motion carried.

Old Business:

1. The IEEE Standards Board has sent copies of the revised C57.12.91-2001 to all the working group members, except Max Cambre. The Chairman will contact IEEE to see why Max did not receive his copy.
2. Jeewan Puri addressed the working group as chairman of the Sub-Committee on Audible Sound and Vibration. Jeewan stated that his sub-committee has approved a re-write of Clause 13 in C57.12.90 to include an option for the user to specify sound intensity measurements. He suggested that our working group make a similar change. Jeewan will email a copy of the revised Clause to the WG Chair, who will intern send it to all the members for review. Before this change could be adopted, a new PAR would be required.
3. SubashTuli was not present to make comments on adopting IEC cooling class designations. The chairman will ask for a volunteer from the WG to review these proposed changes and make a recommendation at the next meeting.
4. Wayne Hansen was not present to provide wording for the changes he recommends to the next revision on Insulation Power Factor Testing. This item will be dropped from future agendas.
5. Nigel McQuin was not present to provide his comments on wording for his proposed changes on resistance measurements, dielectric tests and temperature testing. The chairman will ask for a volunteer from the WG to review these proposed changes and make a recommendation at the next meeting.

New Business:

1. Don Kline informed the W.G. that at least one customer requested “noise” level measurements be made at full voltage and current. It was noted that this is not in accordance with the standard. It was also noted that this is impractical above a certain kVA, depending on the manufacture. Furthermore, it is the opinion of those present that the added noise from the energized winding would be insignificant to the total sound level. There was no motion to further address this issue.
2. The chair will submit a new PAR before the next meeting to address the changes referenced in the minutes.

A motion was made and seconded to adjourn, meeting adjourned at 2:30 pm.

9.10.3 New Business

- Regarding standards C57.12.58 and C57.12.124, Jeewan Puri and Don Kline are reviewing these documents, respectively, and will have comments by Thanksgiving.
- Standards C57.12.56 and C57.12.60 will be combined into one document. Working group chair Dick Provost will schedule a task force meeting for this work around Christmas 2002.
- Max Cambre gave a presentation on standard C57.12.58. Max stated that the appendix on

page 22 was “incomprehensible” (he provide the document as evidence), and he has rewritten the section. He also provided a simple graph to clarify the formulas. This info will be included in a revision for balloting (a PAR will be required for this purpose). Paulette Payne will send info on negative ballots to Don Kline, Max Cambre, and Jeewan Puri.

- Don Kline reported on the failure of medium-voltage transformers where most were of Dry Type design. The cause of failure appears to be due to the interaction of the transformer and vacuum circuit breakers. The use of “snubbers” can minimize the risk of failure. The only way to tell if there is a problem is if a transformer fails upon energization. The “snubber” reduces the transient voltage to “1/2” which eliminates the failures. Customers have asked why transformers cannot withstand these failures. It was suggested that the chopped wave impulse test be used to simulate the transient voltage generated by the vacuum circuit breaker. Don Kline questioned whether the impulse test should be a “routine” test for transformers connected to this type of breaker. Phil Hopkinson asked whose responsibility it really is since we have both over-current and over-voltage devices. It was noted that the liquid standard is being revised. Discussion ensued on the validity of whether the chopped wave impulse test would be sufficient to verify the withstand of the transient voltage caused by the vacuum circuit breaker.

Being no further new business, the meeting was adjourned.

Submitted by Chuck Johnson, Secretary

9.11 Distribution Transformers SC – Ed Smith, Chair

Meeting Time: 3:00pm, Wednesday, October 23, 2002

Attendance: 40 Total

23 Members

16 Guests

1 Guest Requesting Membership

9.11.1 Chair's Remarks & Announcements:

Review of Administrative Committee meeting highlights

- Future Meetings.
- New Members
- Transformer Standards Activity

9.11.2 Working Group Reports

9.11.2.1 C57.12.20 Single Phase Pole Mounted Distribution Transformers

(Copyright: IEEE/NEMA – Joint Copyright MOU) Alan Wilks & Glenn Andersen Co Chairs
(awilks@ermco-eci.com & gwanders@duke-energy.com)

PAR Status: Submitted December 2001

PAR Expiration Date: End of 2005

Current Standard Date: 1997

Current Draft Being Worked On: #VIII Dated October 2002

Meeting Time: 11:00am, Monday, April 15, 2002

Attendance: 32 Total

17 Members

15 Guests

Issues, Remarks & Announcements:

- Introductions were made and the Vancouver minutes were approved.
- Ed Smith reported “No Progress” since the last meeting regarding metrification. Our direction is still to follow IEEE guidelines. If ballots fail, our position of dual dimensioning will be strengthened, as IEEE may allow it on a case-by-case basis. C57.12.34 will be the first document to test the position.
- The MOU between NEMA and IEEE was dissolved as of June 2002, because we have IEEE pars, we can continue work on these standards, there is a task force between IEEE & NEMA to resolve the issues.
- Draft VIII was reviewed with the master changes being the addition of U.S. Customary units as footnotes. There were several minor corrections noted.
- Table 6 was discussed and it was decided to eliminate the statement “ Single Phase Transformer Bushings only” and to put the 16.34 kV note adjacent the 255 mm dimension.
- Paragraph 6.3.3.2 regarding lead identification was discussed and it was agreed to change the wording.
- The drawing in table 7 was discussed but it was agreed that the current draft is correct.
- There was discussed related to a question regarding cover grounding which is not currently in the standard. The manufacturers are to submit their current practices to Glenn Anderson and a proposed wording will be drafted to review at our next meeting in Raleigh
- The meeting adjourned at 12:20pm

9.11.2.2 C57.12.23 Single Phase Submersible Distribution Transformers

(Copyright: **IEEE**) Al Traut & Roger Lee Co Chairs (alant@keco.com & leerj@sce.com)

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

PAR Expiration Date: N/A

Current Standard Date: 1992, Reaffirmed 1999

Current Draft Being Worked On: #IV

Meeting Time: DID NOT MEET

Attendance: N/A

9.11.2.3 C57.12.25 Single Phase Padmounted Distribution Transformers

(Copyright: IEEE/NEMA – Joint Copyright MOU) Ali Ghafourian & Ernie Nols Co Chairs
(ali.ghafourian@us.abb.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: #2 Dated: October 2002

Meeting Time: 1:45pm, Monday, October 21, 2002

Attendance: 27 Total

11 Members

16 Guest

0 Guest Requesting Membership

Issues, Remarks & Announcements:

- Ernie Nols, Public Service Electric & Gas, New Jersey, has agreed to be the Co-Chairman for the Working Group. He replaces John Lazar who has a new area of responsibility with Northern States Power Company.
- Status of C57.12.25 – Seven negative votes were received. All but one has been resolved. The Standard will be re-circulated. John Lazar will resubmit the Standard for ballot.
- Status of the combined Standard C57.12.25 & C57.12.21
- Draft #2 of the combined Standard C57.12.25 (Dead Front) and C57.12.21 (Live Front) dated October 2002 was submitted. Changes made from the previous meeting were discussed and the document was reviewed.
- The Working Group voted and approved that the lifting lugs should have a safety factor of five. That is based on using all lifting lugs.
- Clearances from the secondary spades to ground to be discussed at the next meeting. Manufacturers are requested to provide minimum dimensions.
- Tom Callsen, Exelon, had sent an e-mail to Utility members concerning the heat generated by single phase padmounted transformers. He would like a reply on this subject.
- The meeting was adjourned at 3:15pm.

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)

9.11.2.4 C57.12.28 Pad-Mounted Equipment Enclosure Integrity

(Copyright: IEEE/NEMA – Joint Copyright MOU) Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dhm3@pge.com)

PAR Status: Submitted Approved by NES Com May 23, 2002

PAR expiration Date: May 2007

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: #1.0

Dated: September 29 2002

Meeting Time: October 22, 2002

Time: 8:00 AM

Attendance: 41 Total

17 Members

20 Guests

0 Guest Requesting Membership

Issues, Remarks & Announcements:

- The standard was converted from a word to an IEEE formatted document.
- A Drawing of the penta head bolt with an attached washer was presented.
- A new pry test method was presented. This included drawings of an alternative pry bar tool with up to date component parts.
- Two members of the working group volunteered to review probe related accidents
- Placing limits on the pad-mounted green color range was discussed with additional information to be presented at the next meeting
- Reviewed several changes made to the coating test to update ASTM test methods and make editorial corrections.
- The SCAB corrosion test will be modified to exempt internal cabinet coating systems from the UV accelerated weathering requirement included in ANNEX A.
- Results of the prohesion Corrosion testing were discussed with no recommendation made. Additional testing will be required and presented at the next meeting.

9.11.2.5 C57.12.29 Pad-Mounted Equipment Enclosure Integrity for Coastal Applications

(Copyright: IEEE/NEMA – Joint Copyright MOU) Bob Olen & Dan Mulkey Co Chairs

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

PAR Status: Approved by NES Com May 23, 2002

PAR expiration Date: May 2007

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: #1.0

Dated: September 29 2002

Meeting Time: October 22, 2002

Time: 8:00 AM

Attendance: 41 Total

17 Members

24 Guests

0 Guest Requesting Membership

Issues, Remarks & Announcements:

- The C57.12.29 Standard was converted from a Word document to the IEEE format.
- The Enclosure Security section included in C57.12.28 was inserted into the Coastal Standard for Working Group review. Alterations made to the C57.12.28 Standard Security section in the future

will also be included.

- Editorial corrections and ASTM test method updates to the coating tests were presented and reviewed
- The meeting was adjourned at 10:45 AM

9.11.2.6 C57.12.31 Pole Mounted Equipment Enclosure Integrity

(Copyright: IEEE/NEMA – Joint Copyright MOU) Bob Olen & Dan Mulkey Co Chairs
(bolen@cooperpower.com & dh3@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: 1.4 Dated: March 26, 2002

Meeting Times: October 22, 2002 Time: 8:00 AM

Attendance: 41 Total

17 Members

24 Guests

0 Guest Requesting Membership

- Minutes of the April 16, 2002 meeting approved.
- IEEE balloting was completing on May 24, 2002 with no negative ballots.
- All required documents were sent to the Rev Com committee during July 2002. (Due Date August 6, 2002)
- RevCom committee approved the standard on September 11, 2002
- The approved draft has been turned over to the IEEE editorial staff for publication (Noelle Humenick) will process the standard and has made contact.
- A word copy of the standard has been sent to Noelle with editorial corrections for review
- The IEEE C57.12.31 standard will be published by the end of 2002.

9.11.2.7 C57.12.32 Submersible Equipment Enclosure Integrity

(Copyright: IEEE/NEMA – Joint Copyright MOU)

Bob Olen & Dan Mulkey Co Chairs

(bolen@cooperpower.com & dh3@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: 1.3 Dated: March 26, 2002

Meeting Times: October 22, 2002 Time: 8:00 AM

Attendance: 41 Total

17 Members
24 Guests
0 Guest Requesting Membership

Issues, Remarks & Announcements:

- IEEE balloting was completed on May 24, 2002 with no negative ballots.
- All required documents were sent to the Rev Com committee during July 2002 (Due Date Aug 6 2002)
- Rev Com Committee approved the standard on September 11, 2002
- The approved draft has been turned over to the IEEE editorial staff for publication (Noelle Humenick) will process the standard and has made contact.
- A word copy of the standard has been sent to Noelle with editorial corrections for review.
- The IEEE C57.12.32 Standard will be published by the end of 2002.

9.11.2.8 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 October 2002
Meeting Date: October 22, 2002 Time: 11:00
Attendance: 48 Total
23 Members
25 Guests
0 Guest Requesting Membership

Issues, Remarks & Announcements:

- The PAR has been extended with an expiration date of December 2004. As a result of the accepting proposal at the April meeting, the draft guide has been revised. All of clause 6 text and tables were replaced with the following sentence: "When a user chooses not to use the procedures as defined in clauses 1 through 5 of the standard, Department of Energy and/or NEMA documents can be used to define minimum acceptable efficiency limits." Draft 9 will be submitted for a recirculation ballot.
- NEMA members present explained the changes to TP-1. The liquid filled transformers efficiencies were re-calculated for a reference temperature of 55°C and 50% rated loading. Due to rounding for values in the table, only the values for the small size transformers were impacted. The table for dry type transformers was revised to separate medium voltage into two columns (60Kv BIL and below and greater than 60Kv BIL). The revised document is posted on the NEMA web site. NEMA plans to post an explanation of the changes on the web site.
- Tony Bouza, DOE Program Manager for distribution transformers, briefly discussed the department's activity on distribution transformer loss reduction/ energy efficiency. The DOE web site

www.eren.doc.gov/building/codes_standard/applbrf/dist_transformer.html has drafted documents covering life cycle cost analyst for both liquid filled (design line 1) and for dry type (design line 9). On October 17th, DOE held a web cast to discuss the recently released life cycle cost draft report for dry type transformers. The reports identify the tools and mythology that DOE plans to use to formulate the final rule. Tony solicited comments from users and manufactures on the draft documents for both liquid filled and dry type transformers. There may be future web casts on this subject. Interested parties are encouraged to give their name and e-mail addresses to Tony so he can notify them of future web cast and posting of new data on the web site.

9.11.2.9 C57.12.34 Three-Phase Padmounted Distribution Transformers

(Copyright: **IEEE**) Ron Stahara & Steve Shull Co Chairs
(rjstahara@msn.com & sshull@empiredistrict.com)

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

PAR expiration Date: December 2002

Current Standard Date: NEW Standard Under Development

This NEW Standard is a combination of the following two Standards

- C57.12.22 1989 (Three-Phase Padmounted Distribution Transformers with H.V. Bushings)
(Copyright ANSI)
- C57.12.26 1992 (Three-Phase Padmounted Distribution Transformers with Separable Connectors)
(Copyright ANSI)

Current Draft Being Worked On: 8 Dated: January 2002

Meeting Date: 10-21-2002 Time: 03:15 – 04:30

Attendance: 36 Total

21 Members

9 Guests

6 Guests Requesting Membership

Issues, Remarks & Announcements:

- Ron Stahara called the meeting to order and a Roster was circulated. Steve Shull outlined the request by REVCOM, specifically Bruce Barrows, to modify the current draft to answer the negative comments received during the balloting process. The negative balloters were concerned about the metric dimensions in the document. They had asked for dual dimensioning, U.S. Customary and SI units, in this document. Bruce's comments were that these concerns should be addressed through informative annexes, call out boxes, and/or footnotes. After a lengthy discussion, it was the recommendation of the working group that the document be modified to include footnotes for the U.S. Customary dimensions in the document body, with call out boxes where appropriate. The working group further agreed that all figures and some tables would be dual dimensioned and placed into a normative annex. They instructed Steve Shull to prepare the document for reballoting with these changes.
- Steve Shull asked the working group to consider some possible changes in the future drafts after this draft was approved. These were to increase the minimum impedances on certain kVA sizes to limit

the available fault current. He specifically asked the manufactures in the group to review this possible change for problems. He also asked the group to consider the addition of new type of design for a three-phase transformer to provide a lower profile option than what is currently available. The final item was addressing a comment that was made by CE transformers in the Nashville meeting concerning the parking stand spacing in figure 5B and 5C of this standard. Steve requested that the group review these items and be ready to discuss them at the spring meeting.

9.11.2.10 C57.12.35 Bar Coding For Distribution Transformers

(Copyright: **IEEE**) George Henry Chair (gehenry@centralmoloneyinc.com)

PAR Status: Active for Reaffirmation

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

Current Standard Date: 1996

Current Draft Being Worked On: NONE

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

Issues, Remarks & Announcements:

- ***Ballot Summary***

C57-35-1996 Reaffirmation: IEEE Standard for Bar Coding for Distribution Transformers closed March 04, 2002.

77 Number of eligible people in Ballot Group

60 Affirmative votes

03 Negative votes

0 Abstention votes

63 Votes = 81% Returned

0% Abstention

60 Affirmative votes

3 Negative votes

63 Votes = 95% Affirmative

We have a valid ballot. A request was made for PAR Extension

9.11.2.11 C57.12.36 Distribution Substation Transformers

(Copyright: **IEEE**) John Rossetti & Leon Plaster Co Chairs
(jrossetti@mlgw.org & leon.plaster@us.abb.com)

PAR Status: PAR Approved June 2002

PAR expiration Date: October 2005

Current Standard Date: NEW Standard Under Development

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

Meeting Date: October 22, 2002

Time: 1:45PM

Attendance: 28 Total

15 Members

13 Guests

0 Guest Requesting Membership

Issues, Remarks & Announcements:

- Minutes from the Vancouver meeting were reviewed and approved without any changes.
- Since the April TC meeting, the PARS for both C57.12.10 & C57.12.36 have been approved. The projected completion date for C57.12.36 is Oct 2005
- The first item discussed was the potential need to include requirements from both NEC & C57.12.13. Much of what was discussed revolved around whether the transformer will be located in supervised or unsupervised area. If this standard were to include transformers designated for unsupervised area (access by the general public) specific enclosure and accessory design considerations would be necessary as was previously covered in C57.12.13. It was decided that this standard would only apply to transformers installed in supervised areas; this eliminates the need to include some of the NEC issues discussed.
- Based on the above discussion it was decided to minimize the requirements for enclosure construction and focus on the transformers design. The standard will still address switchgear coordination issues.
- Regarding review of specific sections of the current drafts the following items were discussed.
- Voltage Tables: Evaluate combining tables 4.4, 4.5 and 4.6 and use voltage classes instead of specific voltage ratings. Provide recommendations for practical limits for voltage ratios and kVA limits based on design issues and component limitations. This table(s) will be a baseline and not cover the extreme causes. Users of the standard want to be able to fall back on the limits provided in a standard.
- Impedance: This table will be modified as necessary regarding lower limits, based on standard breaker ratings. This applies to IZ ranges defined up to 500 KVA.
- Taps: Change the statement to always provide taps unless otherwise specified. The standard taps will be (+/-) 2 - 2 ½ %. A suggestion was made to clarify the de-energized tap switch application – “should be used for incoming line adjustment, not secondary regulation”. This may belong in an application guide instead. Another comment was to include the statement that the taps must be designed for full kVA capacity.
- Switchgear Equipment Coordination: This information may best be located in an informative annex.
- Typical Transformer Dimensions: Although there is some desire to have typical transformer dimensions provided in the standard, the general consensus was the due to significant design differences between manufactures required loss evaluation & design economics. There is no practical way to agree on typical dimensions. These transformers are different then the network transformers which are much more regulated due to vault sizes.
- Ending the document review discussion, everyone was asked to provide additional feedback on the remainder of the sections
- The meeting adjourned at 3:00pm.

9.11.2.12 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 1.0 Dated: April 2002

Meeting Date: Tuesday, October 22, 2002 Time: 3:15PM

Attendance: 18 Total

12 Members

6 Guests

2 Guest Requesting Membership

Issues, Remarks & Announcements:

- A draft 2 document will be drawn up before the spring meeting in 2003 covering the items discussed.
- It was suggested that the document address the concept in its wording that Voltage Regulators are used in two different unique area on the power system, Distribution (Line Regulators) and Substation (Substation Regulators). In most cases their requirements are significantly different when it comes to short circuit, ratings and loading practices.
- Dimensions will be kept as metric with the possibility of U.S. Customary in footnotes.
- Discussion on 55°C and 65°C ratings resulted in the decision that both ratings are needed in the standard. The 55°C rating is needed to pair up with the Substation Transformers that are in existence. However the users can specify a 65°C rating for their line regulators that match up with Distribution Transformers.
- The requirements covering short circuit withstand were reviewed in the C57.15 and C57.12.00 documents. Substation Regulators, 167kVA and above, are matched up with Category II and III Power Transformers in the substations where available fault current is limited by the impedance of the transformers. This fault current is commonly below the 25 times rated current value. Depending on their location line regulators, 288 kVA and below, most likely will not see fault currents above 25 times rated current value, but there could be some isolated area that could see higher values. The wording in the standard will be revised to emphasize the 25 times rated current value as a standard for all regulator designs and that the 40 times rated value is only available on 288 kVA designs and below when specified by the user. The voltage regulators are basically autotransformers that depend on the impedance of the power system to limit the available fault current.
- It was recommended that the maximum add amp value be raised from 668 to 875 amps. Based on the C57.131 Load Tap-Changer document, the contact temperature rise over oil temperature cannot exceed 15°C @ rated maximum through current. The manufactures will review their type test regarding their highest rated tap-changer capacity. Load capacity of other current carrying components in the voltage regulators would need reviewed in order to match up with this 875 amp supplementary current rating.
- Application of the types of available pole mounting brackets will be looked at to be placed in the

document. Weights by kVA size are significantly greater than distribution transformers.

- More clarification regarding voltage regulation ranges was placed in the definitions covering the differences between TYPE A and TYPE B voltage regulators.
- Meeting was adjourned at 4:30 PM

9.11.2.13 P1388 Electronic Reporting of Test Data

(Copyright: **IEEE**) Richard Hollingsworth & Thomas Callsen Co Chairs
(rhollin@howard-ind.com & Thomas.Callsen@ExelonCorp.com)

PAR Status: Approved

PAR Expiration Date: December 2005

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

Current Draft Being Worked On: Draft 7

Dated: April 16, 2002

Meeting Date: October 21, 2002

Time: 9:30AM

Attendance: 26 Total

21 Members

5 Guests

0 Guest Requesting Membership

Issues, Remarks & Announcements:

- Meeting was opened with introductions.
- Request was made for a Co-chair from the Utility side. Jerry Smith has submitted the paperwork for his retirement from Mississippi Power Company. We thank Jerry for his many years of service to this Working Group.
- Revisions from the Vancouver meeting were reviewed.
- Minor editing was performed throughout the document.
- Draft 8 will be submitted to the IEEE editorial staff for review.
- A pole of the Working Group will be conducted prior to being submitted for full ballot.
- Meeting was adjourned.

9.11.2.14 C57.144 Guide to Metric Conversation of Transformer Standards

(Copyright: **IEEE**) Dudley Galloway (gallowaytt@aol.com)

PAR Status: Active

PAR Expiration Date: April 2006

Current Standard Date: New Document

Current Draft Being Worked On: D2 Dated: April 2002

Meeting Date: October 23, 2002

Time: 11:00AM

Attendance: 19 Total

7 Members

13 Guests
3 Guest Requesting Membership

Issues, Remarks & Announcements:

- The meeting convened at 11:06. Following introductions, the minutes of Vancouver meeting were approved as amended (with an editorial change).
- The Guide has not been changed since the previous meeting; Draft D2, dated April 2002 remains the latest version.
- The Chair implored the product WG chairs to apply the information in the Draft Guide to their revisions. He also cautioned against excess, unnecessary precision.
- Although not a part of this WG's scope, the safety issue regarding dual dimensioning was raised and discussed briefly.
- The Chair noted that the objective of the guide is proper conversion of the units of measure and NOT any change of the product. A transformer meeting a standard expressed in U.S. Customary units must still meet the standard when expressed in SI units.
- Copies of the Draft Guide will be given to Distribution Transformer Subcommittee Working Group Chairs for their reference.
- A question was raised regarding inclusion of the spreadsheet conversion program guide.
- It was suggested that a joint meeting of the WG chairs be convened in Raleigh to compare content to be converted.
- In Draft D2, the last sentence of clause 3.6 shall be modified to include "probably", to avoid any unforeseen situations that may occur, i.e., "will probably be inconsequential."
- The next step will be to generate Draft 3 in standard IEEE format for review at the Raleigh meeting.
- The meeting was adjourned at 11:50am.

9.11.3 Subcommittee Old Business:

- NEMA/IEEE MOU Termination
- Metrification, Metrification/Imperial "Dual Format"

9.11.4 Subcommittee New Business:

The Distribution Transformer Subcommittee voted to adopt a position statement similar to the Underground Transformers and Network Protectors Subcommittee. It reads as follows

The Distribution Transformer Subcommittee supports metrification on our product standards, however, we strongly recommend, for safety reasons, that for the foreseeable future our standards retain the dual unit system.

CLARIFICATION

By foreseeable future we mean that until such time that the work forces are fully conversant with metrification. Also, are not in favor of putting U.S. Customary units in footnotes or appendices.

Submitted by Ed Smith

9.12 Dielectric Tests SC – Loren Wagenaar, Chair

The Dielectric Test Subcommittee (DTSC) met on Wednesday, October 23, 2002, at 1:30 p.m., in Oklahoma City, OK at the Renaissance Hotel & Cox Business Services Convention Center, with 57 members and 60 guests present. 22 of the guests requested membership on the Subcommittee. See the last page of these minutes for attendance lists.

9.12.1 Chair's Remarks

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on October 20, 2002.

- 3) Chairmen of WGs and SCs should draft Secretaries or Co-Chairs to their group who can chair the meetings on their behalf when they could not attend for personal or professionally related reasons. This will also avoid canceling such meetings.
- 4) Each WG and SC is asked to send an updated roster of their members to Loren.
- 5) There is some early discussion about how to maintain a Central Roster or (Master Contact List) at the Main Committee level to avoid having to do this at the lower levels.
- 6) Next meeting dates and locations are as follows: March 16-20, 2003 in Raleigh, North Carolina; and October 5-9, 2003 in Pittsburgh, Pennsylvania. Potential hosts for future meetings should contact Greg Anderson (gwanderson@ieee.org).
- 7) There was discussion that some people feel the Main Committee meeting on Thursday is too administrative and not technical enough in content, and is not a very valuable use of time. One idea is to do the recognition awards at the Tuesday luncheon.
- 8) There was much discussion on ASC C57; too much to describe here at the Dielectric Test SC meeting. See the web site for complete notes.
- 9) Minutes of the Vancouver meeting are available on the IEEE Committee Web Site.

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

The minutes of the meeting held on April 17, 2002 in Vancouver, BC, Canada were approved as written.

9.12.2 Working Group Reports

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

18 members and 68 guests attended the meeting.

Minutes of the previous meeting April 15, 2002 in Vancouver, BC, Canada were approved.

Discussions continued on the Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors. Sections on integrating results with data from oil analysis, characteristics of acoustic signals and differences between C57.127 and the draft of the Guide were reviewed.

It was the consensus of the WG that we are ready to apply for a PAR for this guide, which will replace C57.127 IEEE Trial-Use Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers.

9.12.2.2 Working Group on Revision of Low Frequency Dielectric Tests, Mark Perkins, Chair; Loren Wagenaar Acting Chair

The working group met Monday, October 21, 2002 at 3:15 PM. Mark Perkins was unable to attend and Loren chaired the meeting.

The reaffirmation of C57.113 was successful. Following are the results:

- 102 people in ballot pool
- 88 responded (86 %)
- 83 affirmative (94 % of those responding)
- 2 negative (2 %)
- 3 abstentions (3 %)

Some comments:

- Must start work on next revision of C57.113 right away
- References and calibration procedures are not up to date
- Guide does not harmonize with IEC 270

Mark will be looking for a chairman to chair this TF. Must be someone who is familiar with the PD equipment. Any volunteers are asked to contact Mark.

Old Business: The revision to temperature correction factors is not yet done; survey will be sent out in the Fall.

9.12.2.3 Working Group on Revision of Impulse Tests – Pierre Riffon, Chair

The WG met on October 22, 2002 from 3:15 pm to 4:30 pm. Twelve members and fifteen guests attended the meeting. Three guests requested membership.

The minutes of the Vancouver meeting were approved as written.

The first technical subject on the Agenda was to discuss the proposal for modifications to clause 10.3.1.1 b) of C57.12.90. This proposal has been also discussed in length during the previous meetings. The proposal consists of specifying a minimum available energy from the impulse generator during impulse tests for cases where the tail time duration of the impulse waveshape is shorter than the minimum allowable limit (e.g. 40 μ s).

The proposed value of 12,5 kJ for Category I transformers (≤ 500 kVA) was found somewhat too high for this class of transformers. This value has been chosen to cover 90% of the studied cases. After a lengthy discussion, it has been decided to revise the proposed minimum impulse generator energy values to cover not more than 80 % of the studied cases. This coverage limit will significantly decrease the required value for Category I transformers but will probably slightly affect the energy levels for the other categories.

The proposal suggests that the definition of the 5 transformer categories to be aligned to the those defined in C57.12.00 for short-circuit performance (ONAN vs ONAF ratings).

An informative Annex will be also written for explaining how these values have been derived.

The intent of this concept is to encourage laboratories to use the optimum configuration of their impulse generator. It also informs the industry that a minimum testing installation capability is required for a specific range of transformers.

The second technical subject on the agenda was to discuss the proposal for modifications to clause 10.3.1.3 of C57.12.90 (chopped wave tests). The proposal consists of specifying a circuit configuration during chopped-wave impulse tests.

The proposal specifies a maximum distance of the chopping device from the terminal of the test object. The proposed maximum distance is one lead length of the height of the transformer, the height being defined as the sum of the bushing and tank heights. The proposal does also prohibit the use of a series resistor in the chopping circuit if the overswing in the opposite polarity is equal to or less than 30%. If the overswing is greater than 30%, it will be permissible to use a series connected resistor in the chopping circuit in order to reduce the magnitude of the overswing in the reverse polarity.

After discussion, it has been agreed upon that the resistor shall limit the overswing in the reverse polarity in between 25% and 35%.

This proposal does not specify any chopping time since this could be difficult to measure with an appropriate accuracy. This proposal will ensure that the same severity, e.g. steepness of the voltage collapse, is applied throughout the industry during chopped wave tests.

Contrary to what is specified in IEEE Std. 4-1995, the WG agreed that limiting the undershoot to 30% for power transformers protected by surge arresters seems to be an adequate value because the voltage excursion produced during tests is higher than the maximum theoretical voltage swing that can be produced in service.

The time-to-chop tolerance proposed (-0 μ s, +2 μ s) has to be slightly increased in order to be in line with the actual tolerance.

Both proposals will be revised according to the comments received and will be discussed during the next meeting.

On New Business, the overshoot on the lightning impulse peak has to be addressed. This subject should also be put on the Agenda of the WG responsible of the revision of the Impulse Test Guide.

Pierre requested an extra time slot at the next meeting, as he always goes over-time.

The meeting adjourned at 4:40 pm on October 22, 2002.

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

This meeting took place on Monday, October 21st at 1:45 PM, with 40 Attendees, of which 11 were members and 29 were guests. 10 of the guests requested membership; this brings our total working group membership to 30.

Introductions of Members and Guests.

The first order of business was to propose that Joe Melanson become secretary of the working group; this was accepted and seconded by the membership.

Other items of business included:

- Our PAR has been approved and the clock is therefore ticking.
- IEEE “Majordomo” email and “grouper” services have been obtained for this working group. The email list is operational but grouper has yet to be set up. There was some discussion of how we intend to utilize these services.
- An electronic copy of the IEC Transformer Impulse Testing Guide, IEC 60076-4 has been obtained and will be made available to our members.
- There were some questions from the floor as to how much of the guide needs to be revised. It was agreed that the entire standard needs some revision.
- A handout was circulated in which the contents of our current guide were itemized into 7 sub-groups. The membership was asked to volunteer to work on the revision of at least one of those sub-groups. We had a very good response to this request, 16 people volunteered, many of whom signed up for more than one sub-group.

Sub-Group	1	2	3	4	5	6	7
# Signed up	7	2	6	9	2	4	5

New Business:

Don Kline requested the floor for a brief discussion on the collapse rate of the chopped wave during the chopped wave impulse test. Don was of the opinion that the wording in the impulse testing standards

should be changed to more clearly restrict the location of the chopping gap and length of interconnecting leads.

Motion to adjourn made and seconded at 2:40PM. Meeting adjourned.

Art requested two meeting slots for the next meeting, one for discussion of impulse guide and one for report on the activities of the HVTT Subcommittee (See Item 9.12.3.3) Loren will request an additional time slot for this WG at the next meeting.

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

1. The minutes of the Previous meeting on April 16, 2002 were approved as submitted.
2. Membership
3. The agenda was approved as submitted.
4. Old Business

Table – Y connected transformers. Values in table final version?

Vote:

Eliminate algorithms	No votes
Algorithms left in tables	2 votes
Place in appendix	Overwhelming majority

Arrester protection levels. C62.2 values

Only arrester standard referred to?	No votes
In appendix, representative table	Majority

Low freq test comparison to be placed in appendix. IEEE vs IEC values are different but not far apart.

Footnote to indicate where IEC values come from:

Preferred IEC levels are 1.7 normal for enhanced, 1.5 for 1 hour test

Footnote for optional IEC levels. 1.8 normal for enhanced, 1.6 for 1 hour test

1.7 normal for enhanced, 1.3 for 1 hour test

High freq test comparison – include in appendix

Table for Y connected transformers. For neutral terminal, use “Impedance grounded” instead of “resistance.”

5. There was no new business.
6. In the absence of additional business, the meeting was adjourned at 2:40 PM.

Phil requested a “manipulatable” electronic version of the table, as the one he has is in Adobe Acrobat format. Loren will get this and pass it on to Phil, who will then modify it and pass it out for comments prior to the Raleigh meeting.

9.12.3 Liaison Reports

9.12.3.1 Surge Protection Devices – Bob Degeneff

Bob Degeneff was not at this meeting; there was no activity, and there was no report.

9.12.3.2 IEC TC14/WG24 – Phil Hopkinson

The last meeting of IEC TC14 was held in Rome, Italy during the week of September 23, 2002. It was reported that the revision of IEC 60076-3 (Insulation levels and dielectric tests) had been approved and the document is being published.

Some work by Haas Nordman was done to put requirements for thermally upgraded paper. The group was asked if anyone knew of any related documents or IEEE requirements for thermally upgraded paper to forward on to the Chairman.

Phil also reported on the European perspective of the switching surge and resonance phenomenon currently under discussion in Bob Degeneff’s WG on Switching Transients Induced by Transformer/Breaker Interaction. This phenomenon involves gas insulated and vacuum breakers with or without the use of shielded cable. Siemens reported that a 400 kV transformer connected to a cable had failed because of this phenomenon. Amplification factors approaching 1000 were observed. The problem was solved when the cable was removed, Pauwels reported that measurements performed at RPI indicate that the first and second resonant frequencies are the ones that cause the damage. From experience with transformers that have failed due to this phenomenon, Phil agrees with some of these observations and disagrees on others.

Snubbers seem to be the answer in most cases. Both IEEE and IEC recommend them. Measurements on systems with and without snubbers indicate that snubbers reduce the voltages by half, perhaps more in some cases.

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

The last meeting was held at the facilities of Florida Power and Light in West Palm Beach, Florida on October 14th and 15th, 2002. He was not able to attend the meeting and since the meeting took place just last week, the Minutes of the meeting are not yet available. Discussion of the revisions to Standard 4 was the main topic on the agenda, and the next meeting of this group will be during February 10th and 11th, 2003 in Lake Placid, NY. Art plans to attend the next meeting and will provide a more detailed report at our meeting in the spring of 2003.

9.12.4 Old Business

9.12.4.1 Phase to Ground Clearances – Loren Wagenaar

Loren reviewed what had been done since the Spring 1999 meeting, and sent it to Subhash and Bill Chiu for comments. General observations and discussion:

- Although the original discussion was about the inclusion of phase-ground clearances in IEEE standards, discussion soon shifted to whether the values given for phase-phase clearances are adequate.
- NESC was established by utilities and is mandatory in most states. It has ph-ph and ph-grd.
- Bipin Patel asked how do NESC distances compare – IEC is highest, NESC in between, and IEEE is lowest.
- Don Platts pointed out the reference in NESC is Rule 235 B 3A, Table 235-4.
- Fred Elliott clarified that NESC has tables for lines and substations.
- Dan Perco suggested generation of some rules for application of phase-to-ground clearances as pertains to bushings.
- The motion was made and seconded to survey the DTSC to use the NESC tables in C57.12.00. All in favor ... none opposed. Loren will do this.

9.12.5 New Business

9.12.5.1 A volunteer is needed as a liaison to the Performance Characteristics Subcommittee's WG on Frequency Response Testing. Rowland James will forward a list of the FRA WG members, and Loren will solicit a liaison.

9.12.5.2 Dan Perco discussed the following information regarding core megger tests:

“I have recently been involved with issues concerning core ground insulation. IEEE standard C57.12.00 requires a 500-volt DC test for class II transformers. This same test is listed as an "other" test for class I transformers. There are no acceptance criteria given for this test in this standard. IEEE standard C57.12.90 does not provide any information on how or when the test should be done.”

“Some users specify that grounding resistors of up to 250 ohms be connected between the core and ground. This is done to limit the core ground current in the event of a core ground fault. I recently witnessed recurrent surge generator tests on a 500 KV coreform single-phase generator transformer. The results indicated that impulse voltages in excess of 100 kV appeared across the resistor during the 1425 kV impulse test on the H1 terminal. This is far and above the resistor or core ground insulation rating. The design of this transformer is typical of many others in this respect. I therefore expect similar results for other types and manufacturers of transformers.”

“I think that transformer users that specify core ground resistors are in danger of a serious service failure. The factory impulse test is normally performed with the core directly grounded. The transformer is consequently not tested with the voltage the core insulation experiences in service. The

core ground insulation will probably fail during a system impulse and cause the transformer to be removed from service.”

“Even when the core is directly grounded, the service voltages for 69 kV and above transformers will exceed the 500-volt IEEE test requirement. This means that these transformers are also in danger of a serious service fault. Most transformer manufacturing facilities that I've visited already have megger test equipment suitable for tests at 2500 volts or even 5000 volts. Many users already specify megger tests with a voltage exceeding the 500 volts in IEEE.”

“I think the IEEE C57.12.00 and C57.12.90 standard core ground tests should be reviewed in light of the above and changed to eliminate the possibility of a transformer service failure. I don't have empirical data on the maximum service voltage on the core ground insulation. Maybe some of the manufacturers do. In the absence of such data, I would recommend an increase in the voltage level of the core ground test to 2500 for transformers having HV windings 69 kV and above. I think that this is still not adequate in some cases. There should be a warning too that this test assumes the core is directly grounded in service. The test can be refined as more data becomes available. The impulse test connections should also be reviewed to consider the core ground service condition.”

The SC meeting adjourned at 10:30 AM.

Minutes respectfully submitted by Stephen Antosz, Secretary.

10.0 Reports of Liaison Representatives

10.1 EPRI – B. Ward

Memorandum



October, 2002

TO: Mr. Donald J. Fallon
Secretary, IEEE Transformers Committee
PSE&G
80 Park Plaza - T14A,
P. O. Box 570
Newark,
NJ 07101-0570

FROM: Barry Ward, Manager, Power Transformers

SUBJECT: **EPRI LIAISON REPORT**

The following report is for inclusion in your minutes for the October 2002 meeting in Oklahoma City:

1. Moisture Dynamics:

EPRI has sponsored extensive research targeted at understanding the dynamic behavior and effects of moisture in transformer insulation systems. A “Moisture Management in Transformers Workshop” will be held October 30 – November 1, 2002 in Edison New Jersey to disseminate critical knowledge gained during the EPRI research. The workshop is open to all and will cover; sources of water contamination, methods and instrumentation for moisture assessment, effects of moisture on transformer insulation and loading, distribution of moisture in transformers, selection of moisture sensors and transducers and existing methods for transformer dryout. Several vendors will also make presentations.

For additional information on this on-going project, the following reports are available: *Power Transformer Insulation Behavior During Overload—Phase 1: Dynamic Behavior of Moisture* (TR-113390), *Transformer Moisture-in-Paper Assessment Method—Field Trial* (TR-114075), *Green-Yellow-Red Diagnostic Method—Transformer H₂O Assessment Method* (TR-1000724), *Transformer Moisture Assessment Method—Phase3: Testing of Nitrogen Blanketed Transformer Insulation and Development of Software Application* (TR-1001939)

and Transformer Condition Assessment and Diagnostic Methods Phase 4: Green-Yellow-Red Diagnostic Method (TR-1001940)

2. Power Transformer Loading Software PTLOAD

Version 6.0 of EPRI's Power Transformer Loading program PTLOAD, was released in July of this year. The software calculates transformer oil and winding temperatures, thermal ratings, insulation loss-of-life, and the likelihood of gas bubble formation. The calculation methods, which incorporate user-specified load and air temperature, are based on the IEEE C57.91-1995, "Guide for Loading Mineral-Oil-Immersed Transformers" as well as the IEC Standard 354, "Loading Guide for Oil-Immersed Power Transformers." The new release includes a three-winding (dual secondary) transformer model and other features.

3. Transformer On-Line Diagnostics and Loading Software

The objectives of this project are the development and installation of software to determine the real-time overload capability of a power transformer without exceeding specified temperatures or significant loss of life, and to monitor the real-time thermal performance of a power transformer to verify that the cooling system is operating in accordance with specifications. The software uses actual load and temperature data from the SCADA system and the PTLOAD calculation engine to check the thermal performance of the transformer in real time. The beta version of the software has been installed at two utilities this month.

4. On-Line Transformer Condition Assessment

This project is a continuation of earlier EPRI efforts to develop an on-line low cost gas analyzer that were abandoned because of baseline drift of the sensors. A "key gas" analyzer uses metal-insulated-semiconductor (MIS) sensors to monitor individual ppm for hydrogen, acetylene, ethylene and carbon monoxide. An EPRI/Micromonitors/Sandia National Labs collaborative project was initiated 2/99 to solve technical problems that have delayed commercial production of the MIS sensors. Current work at Sandia National Labs will first concentrate on producing a complete model for a hydrogen only sensor with lab verification. The feasibility of an acetylene sensor will also be studied.

Experimental work is on going to identify the dynamic behavior of gases and other byproducts associated with loading and internal problems. Current work is focused on the development of on-line monitoring techniques to detect the insulation fault products during overload conditions. Specifically this project will demonstrate the application of fiber optic, infrared or electrochemical sensors for on-line monitoring of specific paper decomposition products.

4. On-Line Frequency Response Analysis (FRA)

Previous work in this project includes the field assessment of the in-situ, on-line impulse technique and the off-line swept frequency method to determine the feasibility of comparing signatures from one technique with signatures from the other, for the assessment of winding movement. Additional field tests were performed in August, 2001. A report titled *On-line Frequency Response Analysis*

System: Development of Specifications (TR-1001942) is now available. Results of the research asked more questions than were answered; consequently, a different direction has been taken for 2002. The current work will attempt to develop the new off-line technique, patented by NEETRAC, into an on-line system. The advantage of the new technique is that it does not require comparison with previous tests to make an analysis of the winding condition.

5. Transformer Expert System - XVisor

The objective of this project is to capture the knowledge of transformer experts and make it usable in an off-line software tool for the evaluation of transformer design questions, condition assessment, problem diagnosis, and identification of maintenance needs. XVisor Version 1.1, which includes an LTC module, is now available. A case study has recently been completed at three utilities in which 105 transformers were analyzed and their condition diagnosed. Transformers with known condition were included. The objective of the study is to prove the validity of the diagnostic engine. The study showed that transformers diagnosed with a risk of failure greater than 50%, were 6 times more likely to fail in a given time period than those with a risk of failure less than 50%. A report will be published by the end of this year.

6. Guidelines for Life Extension of Substations

These guidelines, now published in Final Report TR-105070 dated April 1995, include a large section on transformer inspection, condition assessment, testing, and maintenance practices. An extensive update and extension, *Guidelines for the Life Extension of Substations (CD-ROM Version)*, TR- 1000032 is now available. Work continues to update the guidelines as new information is gathered.

7. Low Maintenance LTC

A workshop was held November 1996 in Tampa, FL. to provide a forum for discussion of LTC problems / maintenance / and ways to improve reliability and reduce maintenance. Proceedings were published in TR-108398 dated June 1997. Two EPRI projects to improve understanding of contact coking, oil filtration effectiveness and monitoring concepts were recently completed. Further work is on going regarding coking, filtration, effect of contact material, the development of oil characteristic signatures for normal and abnormal operation, and novel methods for on-line monitoring. Two reports were published in December 2001. They are: *Transformer Load Tap Changer Management: Diagnostics, Contact Coking, and On-line Oil Filtration* (TR-1006654) and *Development of Load Tap Changer Monitoring Technique: Mechanism of Coking* (TR-1001946). Work has just been completed on the effects of oil quality in LTCs. A report has been published in October 2002 titled *Load Tap Changer Oil Quality Analysis – Lessons Learned* (TR-1001775).

8. Continuous Main Tank On-Line Oil Filtration

The objective of this project is to develop or adopt technologies for a passive on-line filter for mounting on transformers to continuously remove moisture, oxygen, and oil degradation products

to keep oil in pristine condition and thus retard the aging of the cellulose insulation. Laboratory experimental work has been completed. Full-scale simulation tests are in process, and a field demonstration is underway. A patent for a special purpose filter designed for the removal of moisture, oxygen, and certain other chemicals has been issued. Field trials are under way. A report was published in December, 2001 titled: *Transformer Life Extension by On-Line Continuous Oil Treatment and Monitoring: Field Test Report* (TR-1001959). Work is on going to design single purpose, low cost units for dehydration, degassing, and oil reclamation systems.

9. Transformer End of Life Assessment

The objective of this project is to develop methods for assessing the condition of high voltage power transformers nearing end of life. The methods will be based on results obtained from testing aged transformers in-situ in the power system and will provide the basis for informed replace/continue to use decisions to power utilities. The project will identify and/or develop non-destructive techniques suitable for performing the condition assessment, in-situ, under typical field conditions. Testing will be performed on old power transformers that are being replaced. Correlations will be developed between results from on and off-line non-destructive testing (conventional and more novel tests) and destructive assessment, including addressing issues of extrapolation of results to large power transformers. Four transformers have so far been tested and two more will be tested before the end of the year. We are currently looking for additional transformers that are due to be retired and scrapped.

10. Detection, Location and Characterization of Gassing Sources in Power Transformers

The detection of acoustic emissions from pd events is a well-known technique and instrumentation is available. However, acoustic emissions from transformers have been detected in the absence of pd. It has been determined that these signals are produced as a result of the inception of bubbles. Analysis of these signals from a population of gassing transformers could result in a new diagnostic technique for the detection, location and characterization of the gassing sites. Phase I of this project, in which 61 gassing and non-gassing transformers were tested, is now complete. From the results of the tests, a database to relate acoustic emission signal patterns to severity and type of fault is being constructed. In addition, a method of filtering data in post-test analysis was developed to discriminate different sources, remove extraneous emissions, and separate heating and electrical sources. A classifier was developed as a tool for source discrimination and results correlated with field observations. Phase II of this project is just underway; it will build on the existing knowledge and extend the technique to LTCs and circuit breakers.

11. Detection, Location and Characterization of Partial Discharge in Transformers

A two year project to develop instrumentation capable of classifying pd in substations is underway. The first stage of the project involves detection and location of pd; subsequent work will be classification and characterization to identify the materials involved in the pd and, consequently, the likely development of the pd activity. Two 240 MVA transformers, soon to be removed from service due to pd activity, will be used as test beds for the pd analysis work. Both of these units will subsequently be torn down, allowing for confirmation of source and cause of pd activity. This project covers development of hardware, analysis algorithms and field-tested prototypes. These will

be produced through contracts with HV monitoring equipment manufacturers, universities with experience of pd and signal analysis, and collaboration with experts in the area of application. A 3-week field test on one of these transformers was recently completed in which eleven different development, prototype and commercial systems were tested.

12. Development of a Fiber-Optic Acoustic PD Sensor

A fiber-optic, acoustic sensor and instrumentation for in-tank detection and location of pd has been under development for approximately three years. The prototype sensor has been tested successfully in the laboratory. A report titled *Development of a Prototype Fiber-Optic Acoustic PD Sensor For Inside Transformer Installation* (TR-1001943) was published in December 2001. The sensor was successfully tested in an operating transformer in May of 2002. The results of the test have been published in a report titled *Prototype Fiber-Optic Acoustic Partial Discharge Sensor – Lessons Learned Documentation and Field Test* (TR-1001768)

13. High Voltage Instrument Transformers & Bushings

A project has been completed to monitor a large number of HVCTs and bushings in laboratories and in service, including on-line tan delta, partial discharge (pd) and other available monitoring methods. Units were tested to failure to evaluate failure modes, sensitivity of monitoring and to develop "end-of-life" criteria for interpretation of field monitoring data. A Symposium: *HVCTs & Bushings – Failure Prediction & Prevention*, was held September 22-24, 1999 in Portland, Oregon. Proceedings, TR-113649, are published.

Three of the different failure detection methods were tried at three different utility sites. These are: an acoustic pd system for measurements in the field and an on-line tan delta system being evaluated under field conditions but with accelerated aging and an electrical pd method for detecting internal pd, on-line and without taking an outage has been completed.

A new project is currently being initiated to compare on and off-line bushing or HVCT power factor measurements in the field. The measurements from a low cost on-line power factor measurement system, available commercially, will be compared with traditional measurements on good and suspect bushings to determine the relative merits of both tests.

EPRI Power Transformers and HVCTS Working Group

All of the preceding projects are discussed at Working Group meetings held twice each year. The next meeting will be held immediately following the Transformers committee meeting in Oklahoma City on October 24/25.

10.2 SCC4 - P. A. Payne

January 28, 2003

Liaison Report to IEEE PES Transformers Committee

Standards Coordinating Committee on Electrical Insulation – SCC 04

1. Committee Scope:

- *To formulate guiding principles for the evaluation of insulation materials and systems for electrical and electronic applications.*
- *To formulate principles for the identification of insulation materials and systems based on functional tests and/or experience.*
- *To coordinate the preparation of standards for functional test programs and diagnostic methods for the evaluation of insulation materials and systems.*

2. Activities:

The committee will be evaluating whether IEC 62114, Electrical Insulation Systems - Thermal Evaluation can be adopted and IEEE-99 Preparation of Test Procedures for the Thermal Evaluation of Insulation systems for Electrical Equipment be withdrawn.

Respectfully submitted, Paulette A. Payne

10.3 TC 14 TAG - P. J. Hopkinson

MINUTES - TC14 Technical Advisory Group

Place of Meeting: Renaissance Hotel & Cox Business Ctr.
Room 14/15 Oklahoma City, OK
Date & Time: Wednesday, October 23, 2002, 3:30 PM

INTRODUCTIONS

Presiding Officer P. Hopkinson, Technical Advisor

Members Present

P. Hopkinson	Square D Company
S. Kennedy	Niagara Transformer
R. Marek	DuPont
J. Puri	Consultant
H. Jin Sim	Waukesha Electric
P. Payne	PEPCO

Others Present

P. Riffin	Hydro-Quebec
R. Thompson	Energy Delivery Services
J. D. Marlow	GE Prolec
J. Tennant	Ontario Power Generation
J. Foldi	Consultant

S. Choinski

NEMA, TAG Administrator

1. Approval of Previous Minutes

The minutes of the meeting held on April 14, 2002, were approved as submitted.

2. Approval of agenda

The agenda was approved as issued.

3. Membership

4. Old Business

A. The Technical Advisor reported on the IEC TC-14 meetings held in September in Rome, Italy.

B. Thermally-upgraded Kraft paper. Is there an IEEE standard or another standard? Volunteers to look for the standard:

C. Loading guide – P. Payne volunteered to work on standard as long as participation is through electronic means.

D. Member participation – Consideration for broader TAG participation.

TA has recommended we offer prospective WG members the opportunity to participate by conference call, web meeting, etc. instead of the preferred means of physical presence in meetings. By this mechanism, we hope to significantly increase our WG span.

E. Mexico – Dennis Marlow was asked to investigate Mexico's status (P or O member) and to consider being their TA.

F. HV-DC – No one is funded to do work. Possibly F. Elliot if he can participate via electronic means. 14/409/NP – IEC 60378-3 Guide for application

R. Marek needs an insulation expert from the US (possibly J. Matthews).

5. New Business

Technical Advisor for TC14 - Mr Hopkinson reported that his status as TA is in question. His employer is reconsidering its position and may ask him to withdraw his resignation.

6. Time and Place of Next meeting

The chairman noted that the next meeting would be held in March 2003, during the IEEE Transformer Committee meeting in Raleigh, NC.

7. Adjournment

There was no additional business, the meeting was adjourned at 4:35 PM.

REPORTED BY Scott Choinski October 23, 2002

10.4 CIGRE – Jean-Christophe Riboud

10.4.1 Cigré miscellaneous

Last session was held in Paris at the end of august 2002.

Due to a reorganisation which took place during this session the study committee has changed name from SC12 to A2

10.4.2 A2 achievement

Two brochures were published this year as result of working group studies:

N°204 on design review

N°209 On short circuit performances.

Those documents can be purchased from CIGRE all information may be found on www.cigre.org

Two working group reports are ready for publishing they deals with instrument transformers, and life management of transformers

There are currently five working groups ongoing:

- Economics of transformer management

- Transformer lifetime data management

- New advances in DGA

- Converter transformers performances

- Electrical environment of transformer (interaction with breaker in HV networks)

One new working group will start soon on thermal performances of transformer to provide materials to IEC.

You can find more on www.cigre-sc12.org

Submitted by JC Riboud

11.0 Old Business

There were no 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 12:06 PM.

Respectfully submitted,

Donald J. Fallon, Secretary

ATTACHMENT 1 STATUS REPORT OF STANDARDS OF IEEE/PES TRANSFORMERS COMMITTEE

17-Oct-02

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUR DATE PAR DATE 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 IAPSE ICC	7/23/91 6/20/96 2002	Need revision/reaffirmation by 12/02 PAR extended to 12/2002
C57.19.01	STANDARD PERFORMANCE CHARACTERISTICS AND DIMENSIONS FOR OUTDOOR APPARATUS BUSHINGS (IEEE 24)	SINGH PRITPAL (901)696-5228	ICC IAPSE IEC SC36A	12/29/00 2005	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	Need revision/reaffirmation by Dec 2002
NONE					
C57.19.100	GUIDE FOR APPLICATION OF APPARATUS BUSHINGS.	ELLIOTT F. E. (360) 619-6099	SWGR SUB PSR	3/16/95 2001	Balloting Reaffirmation Standard Extended until 12/2001
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	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: DIELECTRIC TESTS					
CHAIR: L. B. WAGENAAR					
PHONE: (614)552-1759					
C57.113 PC57.113	GUIDE FOR PARTIAL DISCHARGE MEASUREMENTS IN LIQUID-FILLED POWER TRANSFORMERS AND SHUNT REACTOR	PERKINS M. [314]382-2100	PSIM IAS/PSE IEC TC14 U	12/5/91 9/15/99 2000	Ready for Ballot PAR extended to 12/2002
C57.127 None	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 2005	
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	PC57.138/D7 APPROVED
C57.98 NONE	IEEE GUIDE FOR TRANSFORMER IMPULSE TESTS	POULIN B. (408)957-8326	NONE	12/2/93 9/11/02 2004	New PAR approved 9/02

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE PARDATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: DISTRIBUTION TRANSFORMERS					
CHAIR: Ed SMITH					
PHONE: (314)677-3421					
C57.12.20	OVERHEAD-TYPE DISTRIBUTION TRANSFORMERS, 500 kVA AND SMALLER: H V 34500 VOLTS AND BELOW, L V 7970/13800Y & BELOW	ANDERSEN GLEN WILKS, A.		6/20/96 2/1/02 2001	PAR for revision approved Feb 2002
C57.12.23	UNDERGROUND-TYPE, SELF-COOLED, 1-PHASE DISTRIBUTION TR WITH SEPERABLE INSULATED HV CONNECT HV 24940GrdY..1V,240...167kVA.	Traut A., Lee R.	T&D IC IAS/REPC	6/12/02 3/18/99 2007	Revised Standard approved June 2002
C57.12.25	REQUIREMENTS FOR PAD-MOUNTED COMP-TYPE, SELF-COOLED, 1-PHASE DISTRIBUTION TR W/SEP INS HV CONN, HV 34500GrdY...167kVA...	LAZAR/GHAFOURI	T&D IC IAS/REPC	5/11/90 12/8/98 1995	Need PAR for next revision.
C57.12.28	Standard for Pad Mounted Equipment - Enclosure Integr.	Olen		5/1/02	
PC57.12.28		262-835-3362			
C57.12.29	Standard for Pad Mounted Equipment - Enclosure Integr.	Olen			
PC57.12.29		262-835-3362			
C57.12.31	Standard for Pole Mounted Equipment - Enclosure Integr.	Olen		9/11/02	
PC57.12.31		262-835-3362		2007	
C57.12.32	Standard for Submersible Equipment - Enclosure Integr.	Olen		9/11/02	
PC57.12.32		262-835-3362		2007	
C57.12.33	GUIDE FOR EVALUATION OF LOSSES IN DISTRIBUTION TRANSFORMERS	PEKAREK T. DUCKETT, D.	PSIM	6/1/98	PAR extended until 12/2004 Ballot closed 4/1999
PC57.12.33				2007	
C57.12.34	REQUIREMENTS FOR THREE PHASE PAD-MOUNTED DISTRIBUTION TRANSFORMERS	Shull, Stahara (417)625-5100	ICC	12/6/00	Par extended until 12/2004 Being Balloted
PC57.12.34				2001	
C57.12.35	STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)	Henry, G.		6/20/96	Need to revise/realfirm by 12/02
NONE				2001	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE PAR DATE REV DUE	STATUS AND COMMENTS
C57.15 PC57.15	REQUIREMENTS, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE REGULATORS	DIAMANTIS T. 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: W. PATTERSON					
PHONE: (919)848-1860					
C57.12.01	GENERAL REQUIREMENTS FOR DRY-TYPE DIST. SULLIVAN J. AND POWER TR INCL THOSE WITH SOLID CAST &/or RESIN-ENCAPSULATED WINDINGS	813 -228-4111	NEMA IA/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 601-34500VOLTS, LV 120-600V	(813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE status 1994	
C57.12.51	REQ. FOR VENTILATED DRY-TYPE POWER TR, SULLIVAN J. 50kVA & LARGER, 3 PHASE, WITH HV 601-34500 LV 208Y/120 TO 4160 VOLTS	(813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE status 1994	
C57.12.52	REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 50kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208Y/120 TO 4160 VOLT	(813) 228-4111		6/12/89 Need PAR for revision to get ANSI/IEEE status 1994	
C57.12.55	CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS	(813) 228-4111		4/7/86 Need PAR for revision to get ANSI/IEEE status 1992	
C57.12.56	TEST PROCEDURE FOR THERMAL EVALUATION OF INSULATION SYST FOR VENTILATED DRY-TYPE POWER & DISTRIBUTION TRANSFORMERS	PROVOST R. L. (302)999-2225		3/1/98 REAFFIRMED IN SEPT 1998 2003	WOULD LIKE TO COMBINE WITH C57.12.60
C57.12.58	GUIDE FOR CONDUCTING TRANSIENT VOLTAGE ANALYSIS OF A DRY-TYPE TRANSFORMER 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	3/1/98 REVISION APPROVED 3/98 6/26/97 2003	WOULD LIKE TO COMBINE WITH C57.12.56
C57.12.91	TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS	BARNARD D. (928) 445-5633	SPD EM T&D	12/6/00 Approved Dec 6, 200 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 SYSTEM OF INSULATION FOR SPECIALTY TRANSFORMER	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 TRANSM	DR.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	DR.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 12/2002 PAR Expires 12/2002
C57.13.5	TEST REQUIREMENTS FOR INSTRUMENT TRANSFORMERS OF A NOMINAL VOLTAGE OF 115KV AND ABOVE	Ma J.	SWGR EM TC 38 US T	9/19/96	Balloting Revision par extended to 12/2002
C57.13.6	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS FOR USE WITH ELECTRONIC REVENUE METERS AND RELAYS	TEN-HAAGEN C. W (603)749-8433	PSIM PSR TD		REVISED PAR DISSAPPROVED 9 /96 NO PAR EXISTS

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: INSULATING FLUIDS					
CHAIR: F. GRYSZKIEWICZ					
PHONE: (617)926-4900					
C57.104	GUIDE FOR THE DETECTION AND DETERMINATION OF GENERATED GAS IN OIL-IMMERSED TRANSFORMERS & THEIR RELATION TO SERVICEABIL.	HEINRICH F. W. (412)941-6924	PE/IC PE/SUB PE/T&D	6/27/91 Balloting 12/10/96 2002	PAR Extended until 12/02
C57.106	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF INSULATING OIL IN EQUIPMENT	KELLY, J. 330-630-7000	NONE	6/12/02 12/9/97 2007	Revision approved 6/2002
C57.111	GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENANCE IN TRANSFORMERS	(617)926-4900	IAS T&D ED&PG	2/2/89 12/10/87 2001	NEED Reaffirmation or Revision Standard Extended until 12/02
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 REACT.	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	12/9/97	PAR extended until 12/02 Need to withdraw or submit new PAR
IEEE 637	GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE	(617)926-4900		6/4/84 2001	Standard Extended until Dec. 2001 NEEDS REVISION/REAFFIRMATION
IEEE 1258	TRIAL-USE GUIDE FOR INTERPRETATION OF GASES GENERATED IN SILICONE-IMMERSED TRANSFORMERS	GRYSZKIEWICZ f. (617)926-4900	T&D ICC	6/15/95 0	PAR Withdrawn

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
SUBCOMMITTEE: INSULATION LIFE					
CHAIR: D. PLATTS					
PHONE: (610)774-4686					
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	LOWDERMILK L. A (704)462-3113	PE/PSR IA/PSE PE/T&D	6/26/99 12/10/96 2004	
C57.119	RECOMMENDED PRACTICE FOR PERFORMING TEMP. RISE TESTS ON OIL-IMMERSED POWER TRANSFORMER AT LOADS BEYOND NP RATING (P838)	S. Tuli 262-547-0121	SWGR SUBS SCC4	10/10/01 5/16/00 2006	Approved New Recommended Practice
C57.91	GUIDE FOR LOADING MINERAL OIL-IMMERSED TRANSFORMERS	PIERCE L. (706)291-3166	SUB T&D PSE	6/14/95 3/24/00 2000	reaffirmation and corrigenda being balloted PAR for corrigenda approved 3/2000
IEEE1276	IEEE GUIDE FOR THE APPLICATION OF HIGH TEMPERATURE INSULATION MATERIALS IN LIQUID-IMMERSED POWER TRANSFORMERS	FRANCHEK M. A. (802)748-3936	T&D	6/1/97 3/21/96 2002	Approved as full use guide

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUBDATE PARDATE 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	Balloting complete, awaiting publishing
PC57.133					
C57.142	A guide to describe the Occurance and Mitigation of Switching Transients Induced by Transformer/Breaker interaction	DEGENEVEFF, R. 518-276-6367		12/7/00	
PC57.142					
C57.18.10	REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS	KENNEDY S. P. (716)896-6500	NONE	3/1/98	STANDARD APPROVED MARCH 1998
NONE				2003	
C57.21	REQUIREMENTS, TERMINOLOGY, AND TEST CODES 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: E.G. HAGER					
PHONE:					
PC57.143	Guide for Application of Monitoring Equipment to Liquid Immersed Transformers and Components	Lux/D. Chu		12/5/02	
C57.116 NONE	GUIDE FOR TRANSFORMERS DIRECTLY CONNECTED TO GENERATORS	REITTER G. (415)508-2850		1/3/89 2005	Reaffirmed 6/2000
C57.117 NONE	GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS	CASH D. (702) 227-2316		6/17/92 2003	REAFFIRMED 1998
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 1993	Need PAR Coordinate with C57.12.36
C57.120 NONE	LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS	JACOBSEN R.	SUB IAS EM IEC ED&PG	12/29/00 5/1/80 2005	Reaffirmed 12/29/00
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 6/28/87 2003	REAFFIRMED 1998
C57.131 NONE	REQUIREMENTS FOR LOAD TAP CHANGERS	Henning, W.		3/16/95 2001	Reaffirmation ballot underway Extended until 12/2001
C57.135 C57.135	GUIDE FOR APPLICATION, TESTING, INSTALLATION AND OPERATION OF PHASE ANGLE SHIFTING TRANSFORMERS	TRUMMER /Lundqu 43-3172-606-404	PSRC IEC TC14 EMC IAS/PSP	12/5/01 2006	Standard approved 12/5/01
C57.140 PC57.140	Evaluation and Reconditioning of Liquid Immersed Pow Transformers	JAMES, R. (504)576-6246		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	PUB DATE PAR DATE REV DUE	STATUS AND COMMENTS
C57.17 ANSI	REQUIREMENTS FOR ARC FURNACE TRANSFORMERS	CORSI D.		1986	STANDARD HAS BEEN WITHDRAWN WG has been established, No PAR submitted
C57.93 NONE	GUIDE FOR INSTALLATION OF LIQUID-IMMERSED POWER TRANSFORMERS.	LAU M. (604)528-3201	NONE	12/12/95 2006	Need PAR Reaffirmed on 6/13/01
SUBCOMMITTEE: Standards					
CHAIR: T.A. PREVOST					
PHONE:					
PC57.144	Guide to Metric conversion of Transformer Standards	Dudley, R.		12/5/02	
C57.12.00 VARIOUS	GENERAL REQUIREMENTS FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS	TULLI S. (414)547-0121		6/21/00 6/13/01 2005	
C57.12.13 ANSI	CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS			9/2/81 1987	ASSIGN TO SUBCOMMITTEE NEMA STANDARD
C57.12.53 ANSI	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND SINGLE-PHASE WITH SEPARABLE INSULATED H-24940 grdY/14400 V AND ≤; LV 240/120 V			0	ONLY TITLE EXIST (NO PAR) IS IT REQUIRED?
C57.12.54 ANSI	REQUIREMENTS FOR DRY-TYPE, UNDERGROUND 3 PHASE DISTRIBUTION TRANSFORMERS, 2500 KVA OR ≤; HV 24940 grdY/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 PC57.12.80	TERMINOLOGY FOR POWER & DISTRIBUTION TRANSFORMERS	TRAUB T. P. (312)394-2704	T&D SUBS	5/1/92 6/14/95 2002	Submitted to REVCOM for approval 6/2002 PAR extended to 12/02
C57.12.90 None	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF ...	TULLI S.		6/26/99 6/15/95 2004	Apply for new PAR for further revision

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	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,34500GrdY..& BELOW,1V,480 V AND BELOW	SULLIVAN J. (813) 228-4111	T&D IAS/PSEC IC IEC TC 14 IAS/REPC	3/17/94	Need new PAR
C57.12.40	REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMersed)	PLASTER, R.L. (804) 275-2142	T&D IAS/PSEC ICC IEC TC14 IAS/REPC NEMA	2/1/02	PARApproved feb. 2002
C57.12.44	STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS	MULKEY D. H. (415)973-4699	T&D IAS/PSEC SWGR EEI IAS/REPC NEMA	8/1/00	Revised Standard approved 8/2000
C57.12.57	REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500KVA AND BELOW, W/HV 34500V AND BELOW,1V 210Y..AND 480Y..	ROBINSON, A.	T&D EEI/T&D SCC14	3/18/92 12/5/91 2000	Need new PAR to establish standard

Attachment 2 **COORDINATION ACTIVITIES OF THE IEEE/PES TRANSFORMERS COMMITTEE**

17-Oct-02

PROJECT DATE	TITLE	COMMITTEE	CONTACT	COORDINATOR	TR SUBCOMM	STATUS
PC 37.104	GUIDE FOR AUTOMATIC RECLOSING					
7/19/96	PSRC	WILLIAM STRANG	618-288-9211	H. J. SIM	702-227-2316	PERFORMANCE CHARACTERISTICS
PC37.122	STANDARD FOR GAS-INSULATED SUBSTATIONS					
3/20/97	SUBS	ARUN ARORA	303-674-7973	J. E. SMITH	919-827-3220	INSTRUMENT TRANSFORMERS

NOTE: Vancouver and OKC info. not yet factored into MAX or AVG figures. Check Committee website for future update.

GROUPS	NO I A Apr. 99	Monterra Nov. 99	Nash TN Apr. 00	Niagara Oct 00	Amster Apr01	Orlando Oct 01	Van R C Apr02	OKC OK Oct 02	MAX	AVG
Committee Registration: Members and Guests	262	275	302	361	265	280	280	280	361	285
Sponsors		35	94	94	67	60	81	81	94	63
Luncheon	262	216	175	217	131	140	161	176	262	196
SC ADMINISTRATIVE	22	23	23	22	18	24	23	20	24	21
NEWCOMERS ORIENTATION								~30		
SC Meeting and planning					15	17	22	18	15	15
SC AUDIBLE NOISE AND VIBRATION	28	31	21	21	17	27	25	17	32	25
WG Sound measurements							23	19		
WG Transformer siting guide C57.136										
SC BUSHINGS	11	27	28	28	28	20	42	44	32	26
WG Revision C57.19.00	22	23	25	38	25	27	36	29	38	28
TF Draw Lead Bushings	20	16	24	27	18	13			27	21
WG Revision C57.19.01	24	22	19						38	27
SC DIELECTRIC TESTS	52	68	91	96	62	87	93	91	117	96
WG Revision to Low Frequency Tests		54	48		34	48	40		54	41
WG Revision of Transient Dielectric Tests		35	43	37			38	40	43	34
TF Rev. to Impulse Tests						19	41	27	19	19
TF L.F. Transformers Dielectric Test Table	28	37		46	60	45	46		46	43
WG Partial Discharge Tests	41	66	47	66	65	44	41	86	66	55
SC DISTRIBUTION TRANSFORMERS	36	34	53	41		50	45	40	53	42
WG Dist. Substation Transformers C57.12.36	22		40	37		32	22	28	40	29
WG Overhead Type Distr. Transfs. C57.12.20	35	28	49	39		40	36	32	49	36
WG Single-Phase Submersible C57.12.23	16	10	20	18					41	21
WG Single-Phase Deadfront Padmount C57.12.25	30		47			33	35	27	47	38
WG Bar Coding									40	40
WG Loss Evaluation C57.12.33			45			49	41	48	49	47
WG Electronic Data Transmittal			22			17	16	26	22	17
WG Three-Phase Padmount C57.12.34	23		42			33	40	36	42	33
WG Step-Voltage and Induction Regs C57.15	9					26	26	18	26	17
SC DRV-TYPE TRANSFORMERS	27	25	25	31	20	20	21	20	33	25
WG Test Code C57.91	22	18	11	24	12	10	13	12	23	18
WG Drv-Type Reactors	13	9	10	11	13	7	10	10	13	10
WG Drv-Type Thermal Eval. And Flammability										
WG Drv-Type General Requirements C57.12.01	18	26	23	23	14	25	20		28	23
WG Drv-Type Thru Fault Current C57.12.59			15	16					16	16

NOTE: Vancouver and OKC info. not yet factored into MAX or AVG figures. Check Committee website for future update.

GROUPS	NO I A Apr. 99	Monterro Nov. 99	Nash TN Apr. 00	Niaagara Oct. 01	Amster Apr01	Orlando Oct. 01	Van R C Apr02	OKC OK Oct 02	MAX	AVG
SC HVDC CONVERTER TRANS & REACTORS	8	13	7	10	15	7	13	14	19	10
IEC TC 14 TAG				37	30	14	27	12	37	27
SC INSTRUMENT TRANSFORMERS	11	10	10	17			15	16	13	11
WG C57.13.5 Test Req Instr Transf >115 kVA	12	13	10	13	13	16	12		20	14
WG C57.13.6 Instr Transf for Electronic Meters & Relays		20	11				11	13	20	16
WG Revision of C57.13	12			10	10		9	12	17	11
SC INSULATING FLUIDS	56	68	75	66		70	33	39	84	70
SC INSULATION LIFE	65	56	51	66	30	109	90	84	109	64
WG Loading Lin. Transformer		108		58		76	86		108	81
WG Revision of Temperature Test Code	24	29							29	26
WG Thermal Duplicate	34	40	27		30	26			40	31
TF Winding Temperature Indicators	16	25	27	28		23	22	23	32	25
TF On Temperature Rise Clause 5, C57.12.00						27	34	25	27	27
SC PERFORMANCE CHARACTERISTICS	45	58	69	82	81	102	110	115	102	71
WG Loss Tolerance and Measurement	26	29	33	37	29	31	29	24	37	30
WG PCS Rev. C57.12.00	75	65	49	70	37	63	51	53	75	57
WG PCS Rev. C57.12.90	28		42	65	34	44	76	91	65	41
TF Joint/PSIM low of measurement							22	50		
WG Switching Transients	40	0	52	49	39	50	45	60	52	42
WG DETC specifications and tests		50	49	40		3	62		50	43
SC POWER TRANSFORMERS	42	59	66	109	80	116	112	110	116	65
WG LTC Performance	25	30	24	21	29	24	40	44	31	27
WG C57.140 Transformer Life Extension	31	46	62	48	35	66	66	72	66	48
WG Monitoring of Liquid Immersed Transformers	20	54		55	70			82	70	54
TF Control Cabinet Guidelines						49	29	42	49	49
WG Revision of C57.12.10			37	30	27	34	28	40	37	32
WG West Coast							20	11	13	13
WG Installation of Liquid Filled Transformers, C57.93					39		57	59	39	39
WG Phase Shifting Transformers C57.137	31	34	26	45	25				45	33
SC STANDARDS	5	23	38		32	47	30		47	23
Standards Development Practice Review									8	
SC UNDERGRND TRANS & NETWK PROTCS	18	21	26	18	3	13	14	13	26	16
WG Three-Phase Underground Transfs. C57.12.24	10	14	27	15	4	9			27	14
WG Liquid-Filled Sec. Network Transfs. C57.12.40	17	15	16	15		14	14	15	17	16
WG Secondary Network Protectors C57.12.44		12	10	14		10	8	8	14	11
WG Dry-Type Network Transfs. C57.12.57	5	10	10	15		9		7	15	9

Note: Data maintained for four years only