IEEE / PES Transformers Committee

Approved

Meeting Minutes

Costa Mesa, CA

March 23, 2006

The Minutes of the IEEE/PES Transformers Committee Meeting held
March 23, 2006 in Costa Mesa California, USA
were officially approved at the
Fall 2006 Committee Meeting
October 26, 2006 in Montreal, Quebec, Canada.
Motion Made by Phil Hopkinson
Seconded by Bill Chiu
The vote was Unanimous

Officially Certified
James Edward Smith
Secretary
IEEE/PES Transformers Committee

IEEE / PES Transformers Committee Meeting

March 23, 2006
Costa Mesa, CA USA

Approved
Minutes

Minutes and information available on the Committee Website:

www.transformerscommittee.org

IEEE/PES TRANSFORMERS COMMITTEE MEETING
Costa Mesa, CA, USA

March 23, 2006

ATTENDANCE SUMMARY

Main Committee Meeting Attendees

ABI-Samra, Nick
Aho, David
Amos, Richard
Anderson, Gregory
Angell, Don
Ares, Ignacio
Arteaga, Javier
Barker, Ron
Barnard, David
Bartley, William
Basu, Bikash
Beaster, Barry
Beckman, Stephen
Bello, Oscar
Berler, Zalya
Blew, David
Boettger, William
Bray, Frank
Brown, Kent
Burns, Clayton
Bush, Carl
Callsen, Thomas
Cancino, Alvaro
Castellanos, Juan
Chiu, Bill
Choinski, Scott
Chu, Donald
Cooper, Tommy
Corkran, Jerry
Craven, Michael
Darovny, William
Darwin, Alan
Davis, Eric
de la Cruz, Dan
Del Rio, J. Arturo
Dix, Larry
Dohnal, Dieter
Dorris, Don
Drexler, Charles
Duckett, Don
Dudley, Richard
Elder, Lonnie
Elliott, Fred
Ellis, Keiyh
Fairris, James
Fallon, Donald
Fausch, Reto
Forsyth, Bruce
Fortin, Marcel
Foster, Derek
Ganser, Robert
Garcia, Ramon
Girgis, Ramsis
Goodwin, David
Graham, James
Graham, John
Gruber, Myron
Haas, Michael
Haggerty, N. Kent
Hammers, Jack
Hanique, Ernst
Hanus, Ken
Harley, John
Hayes, Roger
Heinzig, Peter
Hochanh, Thang
Hoffman, Gary
Hollingsworth, Richard
Hopkinson, Philip
Johnson, Charles
Kadar, Laszio
Kalra, C J
Kasanow, Alan
Keithly, David
Kelly, Joseph
Kennedy, Sheldon
Khalin, Vladimir
Kim, Dong
Klaponski, Brian
Kyle, Randall
Lackey, John
Lamb, Michael
Lapointe, Sylvain
Lau, Michael
Lee, Dennis
Lee, Terence
Lemke, Eberhard
Leuenberger, Boyd
Lewis, Timoyhy
Lundquist, Thomas
Luo, Shawn
Marek, Richard
Marlow, Dennis
Matthews, John
Matthews, Lee
McCulla, Gary
McNelly, Susan
McShane, Patrick
Mehta, Shirish
Miller, Jermel
Miller, Kent
Moe, Edward
Molden, Arthur
Moore, Harold
Mulkey, Daniel
Murphy, Jerry
Nguyen, Van Nhi
Ogajanov, Rudolf
Olafsson, Gylfi
Olen, Robert
Oommen, T. V.
Oriti, Samuel
Paiiva, Gerald
Parkinson, Dwight
Patni, Prem
Patwardhan, Jayant
Platts, Donald
Ploetner, Christoph
Polishchuk, Izyaslav
Poulin, Bertrand
Powell, Paulette
Powell, Lewis
Prevost, Thomas
Raymond, Timothy
Rega, Chris
Rensi, Randolph
Revelle, Ryland
Romano, Ken
Schuette, Christoph

Schweiger, Ewald
Shertukde, Hemchandra
Sim, H. Jin
Simpson, Jr., R
Singh, Pritpal
Smith, Edward
Snyder, Steven
Sparling, Brian
Spitzer, Thomas
Spurlock, Michael
Stahara, Ronald
Steineman, Andrew
Stenestam, Bengt-Olof
Stiegemeier, Craig
Stinson, David
Swinderman, Craig
Ten Haagen, Christopher
Termini, Giuseppe
Traut, Alan
Tuli, Subhash
Vailoor, Vasanth
Vir, Dharam
Virelli, Greg
Vogel, Herman
Wagenaar, Loren
Wagner, Dieter
Wallach, David
Ward, Barry
Watson, Joe
Wicks, Roger
Wilks, Alan
Yule, Kipp
Zhao, Peter
Ziomek, Waldemar

IEEE/PES TRANSFORMERS COMMITTEE MEETING
Costa Mesa, CA, USA

March 23, 2006

Transformers Committee Members As of the Spring 2006 Meeting

Aho, David - CM
Allan, Dennis - CM
Allustiarti, Raymond - CM - EM
Anderson, Gregory - CM
Antosz, Stephen - CM
Ares, Ignacio - CM
Arnold, James - CM - EM
Arteaga, Javier - CM
Ayers, Donald - CM
Balma, Peter - CM
Barker, Ron - CM
Barnard, David - CM
Barnes, Michael - CM
Bartley, William - CM
Bassett, Thomas - CM
Beaster, Barry - CM
Benson, Richard - CM - LM
Binder, Wallace - CM
Blackburn, Gene - CM
Blew, David - CM
Boettger, William - CM
Borst, John - CM
Callsen, Thomas - CM
Cash, Donald - CM - LM
Chiu, Bill - CM
Chu, Donald - CM
Colopy, Craig - CM
Cooper, Tommy - CM
Corkran, Jerry - CM
Crotty III, John - CM
Crouse, John - CM
Damico, Frank - CM
Darovny, William - CM
Darwin, Alan - CM
Daubert, Ronald - CM
Davis, Eric - CM
Davis, Larry - CM
Degeneff, Robert - CM
Dix, Larry - CM
Dohnal, Dieter - CM
Duckett, Don - CM
Dudley, Richard - CM
Elliott, Fred - CM
Ellis, Keith - CM
Fallon, Donald - CM
Feghali, Pierre - CM
Ferreira, Marcos - CM
Fleeman, Jeff - CM
Foldi, Joseph - CM
Foster, Derek - CM
Franchek, Michael - CM
Galloway, Dudley - CM
Gardner, James - CM
Gaytan, Carlos - CM
Ghafourian, Ali - CM
Girgis, Ramsis - CM
Graham, John - CM
Graham, Richard - CM
Griesacker, Bill - CM
Gruber, Myron - CM
Grunert, Robert - CM
Gryszkiewicz, Frank - CM
Haas, Michael - CM
Hager Jr., Everett - CM
Haggerty, N Kent - CM
Hall, A C - CM
Hammers, Jack - CM
Hanique, Ernst - CM
Hansen, Wayne - CM
Hanus, Ken - CM
Harley, John - CM
Harlow, James - CM - LM
Hartgrove, Robert - CM
Hayes, Roger - CM
Hayman, Brent - CM
Heinzig, Peter - CM
Henning, William - CM
Hochanh, Thang - CM
Hollingsworth, Richard - CM
Hopkinson, Philip - CM
Iman, Mike - CM
James, Jr., Rowland - CM
Jhonsa, Virendra - CM
Johnson, Charles - CM
Jonnatti, Anthony - CM - LM
Juhlin, Lars-Erik - CM
Kelly, Joseph - CM
Kennedy, Sheldon - CM
Kennedy, William - CM - EM
Khalin, Vladimir - CM
Kline, Alexander - CM
Lackey, John - CM
Ladroga, Richard - CM
Lau, Michael - CM
Lewis, Timothy - CM
Lindgren, Stanley - CM - LM
Lowdermilk, Larry - CM - LM
Lowe, Donald - CM
Lundquist, Thomas - CM
Ma, Joseph - CM
MacMillan, Donald - CM
Makinson, David - CM
Marek, Richard - CM
Marlow, Dennis - CM
Matthews, John - CM
Matthews, Lee - CM
McClure, Phillip - CM
McNelly, Susan - CM
McQuin, Nigel - CM
McShane, Charles Patrick - CM
McTaggart, Ross - CM
Mehta, Shirish - CM
Miller, Kent - CM - LM
Millward, Paul - CM
Molden, Arthur - CM
Moore, Harold - CM - LM
Morehart, Walter - CM - LM
Mulkey, Daniel - CM
Murphy, Jerry - CM
Musil, Richard - CM
Nguyen, Van Nhi - CM
Nicholas, Ray - CM
Niemann, Carl - CM - LM
Olen, Robert - CM
Olson, Tim - CM
Paiva, Gerald - CM
Papp, Klaus - CM
Patel, Bipin - CM
Patterson, Wesley - CM
Patton, Jesse - CM - LM
Pekarek, Thomas - CM
Perco, Dan - CM
Perkins, Mark - CM
Pierce, Linden - CM - EM
Platts, Donald - CM
Poulin, Bertrand - CM
Powell, Paulette - CM
Preininger, Gustav - CM
Prevost, Thomas - CM
Progar, John - CM
Puri, Jeewan - CM
Purohit, Dilip - CM
Raymond, Charles - CM
Raymond, Timothy - CM

Reed, Scott - CM
Reitter, George - CM
Riffon, Pierre - CM
Risse, Peter - CM
Robbins, Chris - CM
Robinson, Arlise (Butch) - CM
Romano, Ken - CM
Rossetti, John - CM
Russwurm, Dirk - CM
Sampat, Mahesh - CM
Sankar, Vallamkonda - CM
Savio, Leo - CM
Schappell, Steven - CM
Schweiger, Ewald - CM
Sharma, Devki - CM
Shertukde, Hemchandra - CM
Shteyh, Ibrahim - CM
Shull, Stephen - CM
Sim, H. Jin - CM
Singh, Pritpal - CM
Smith, Edward - CM
Smith, James - CM
Smith, Jerry - CM - EM
Snyder, Aaron - CM
Snyder, Steven - CM
Spitzer, Thomas - CM
Stahara, Ronald - CM
Stensland, Leonard - CM - EM
Stewart, Peter - CM - CM
Stiegemeier, Craig - CM
Stoner, Ronald - CM
Sullivan, John - CM
Swinderman, Craig - CM
teNyenhuis, Ed - CM
Termini, Giuseppe - CM
Thompson, Jim - CM
Thompson, Robert - CM
Traub, Thomas - CM
Trummer, Edgar - CM
Tuli, Subhash - CM
Vaillancourt, Georges - CM - EM
Veitch, Robert - CM
Verdolin, Roger - CM
Wagenaar, Loren - CM
Wallach, David - CM
Ward, Barry - CM
Watson, Joe - CM
Weffer, Felipe - CM
Whearty, Robert - CM
Wiegand, Dave - CM - LM
Wilks, Alan - CM
Wimmer, William - CM
Woodcock, David - CM
Yule, Kipp - CM
Zhao, Peter - CM
Ziomek, Waldemar - CM

Membership Code

CM
Committee Member

CM - EM
Committee Member - Emeritus Member

CM - CM
Committee Member - Corresponding Member

CM - LM
Committee Member - IEEE Life Member

AP
Active Participant

I I
Interested Individual

IEEE/PES TRANSFORMERS COMMITTEE MEETING
Costa Mesa, CA, USA

March 23, 2006

ATTENDANCE SUMMARY

Committee Members and Guests Present at the Spring 2006 Meeting

Abi-Samra, Nick
Aho, David
Alfonso, Nelson
Allen, Jerry
Amos, Richard
Anderson, Gregory
Angell, Don
Antosz, Stephen
Antweiler, Jim
Ares, Ignacio
Armstrong, James
Aromin, Venzon
Arteaga, Javier
Baldauf, Joao
Ballard, Jay
Baranowski, Derek
Barker, Ron
Barnard, David
Barnett, Darren
Barrientos-Torres, Israel
Bartek, Allan
Bartels, Terry
Bartley, William
Basu, Bikash
Beaster, Barry
Beckman, Stephen
Bello, Oscar
Benach, Jeff
Berler, Zalya
Bertolini, Edward
Betancourt, Enrique
Blackmon, Jr., James
Blake, Dennis
Blew, David
Boettger, William
Bolliger, Alain
Boman, Paul
Branca, Dennis
Bray, Frank
Breytenbach, Richard
Brown, Kent
Buchanan, Paul
Burns, Clayton
Burns, David
Busch, Michael
Bush, Carl
Callsen, Thomas
Cancino, Alvaro
Cantrell, Rick
Carlos, Arnaldo
Carulli, Joeseph
Caskey, John
Castellanos, Juan
Chamberlain, Nikki
Cherry, Donald
Cheung, Joseph
Chisholm, Paul
Chiu, Bill
Chmiel, Frank
Choinski, Scott
Chu, Donald
Claiborne, C. Clair
Comely, Tracy
Cooper, Tommy
Corkran, Jerry
Corsi, Domenico
Costa, Florian
Craven, Michael
Crotty III, John
Damico, Frank
Darovny, William
Darwin, Alan
Davis, Larry
Davis, Eric
Davydov, Valery
de la Cruz, Dan
Del Rio, J. Arturo
dela Houssaye, Kevin
Dix, Larry
Dohnal, Dieter
Dorris, Don
Doutrelepont, Alexander
Drexler, Charles
Duckett, Don
Dudley, Richard
Dukarm, James
Dunlap, David
Elder, Lonnie
Elliott, Fred
Ellis, Keith
Erkan, Yavuz
Fairris, James
Fallon, Donald
Faulkenberry, Michael
Fausch, Reto
Feghali, Pierre
Forrest, George
Forsyth, Bruce
Fortin, Marcel
Foster, Derek
Franchek, Michael
Frimpong, George
Ganser, Robert
Garcia, Ramon
Gardner, James
Garner, Charles
Garza, Joseph
Gerth, Juergen
Getson, Douglas
Ghafourian, Ali
Ghosh, Prodipto
Gill, Geoffrey
Girgis, Ramsis
Gomez, Rolando
Gonzalez de la Vega, Jorge
Goodwin, David
Graham, John
Graham, James
Griesacker, Bill
Grijuela, Jose
Gromlovits, Mark
Gruber, Myron
Guardado, Jeremy

Guerra, Jorge
Guillaume, Perigaud
Haas, Mark
Haas, Michael
Haasz, Jodi
Hager Jr., Everett
Haggerty, N Kent
Hammers, Jack
Hanique, Ernst
Hanus, Ken
Hardin, Michael
Harley, John
Hatch, Stanley
Hayes, Roger
Heinzig, Peter
Hennessy, John
Henning, William
Herz, Josh
Hochanh, Thang
Hoffman, Gary
Holifield, Thomas
Hollingsworth, Richard
Holsomback, Steve
Hopkinson, Philip
Huguet, Fran
Hussain, Mohammad
Iman, Mike
Jafarnia, Mostafa
Jakob, Fredi
James, Jr., Rowland
Jaroszewski, Marion
Jauch, Erwin
Jeong, Benny
Jhonsa, Virendra
Johannson, Larry
Johnson, Charles
Kadar, Laszlo
Kalra, C J
Kasanow, Alan
Keithly, David
Kelly, Joseph
Kennedy, Sheldon
Khalin, Vladimir
Kim, Dong
Kim, Hyong Sun
King, Gary
Kircher, Christophe
Klaponski, Brian
Knoll, Ernst
Knorr, Wolfgang
Kojovic, Ljubomir
Kraemer, Axel
Kriska, Jeremy
Krump, Reiner
Kyle, Randall
Lackey, John
Ladroga, Richard
Lamb, Michael
Lapointe, Sylvain
Lau, Michael
Lee, Dennis
Lee, Jason
Lee, Terence
Legrand, Bertrand
Lemke, Eberhard
Lemos, Gilbert
Leuenberger, Boyd
Lewis, Timothy
Lindgren, Stanley
Lopes, Ricardo
Lundquist, Thomas
Luo, Shawn
Mamtora, Jitendra
Marek, Richard
Marlow, Dennis
Martin, W. Michael
Martin, Terence
Martinez, Rogelio
Martins, Alberto
Matthews, John
Matthews, Lee
May, Randel
Mayer, Robert
McCarthy, J David
McClure, Phillip
McCulla, Gary
McCullough, Doug
McIver, James
McNelly, Susan
McShane, Charles Patrick
McTaggart, Ross
Mehrotra, Vinay
Mehta, Shirish
Melanson, Joseph
Miller, Kent
Miller, Jermel
Millward, Paul
Miram, Per
Moe, Edward
Molden, Arthur
Moore, Harold
Morgan, Dan
Morris, Tim
Mulkey, Daniel
Murphy, Jerry
Mushill, Paul
Neal, Jason
Nelson, Thomas
Nguyen, Vuong
Nguyen, Van Nhi
Nicholas, Ray
Nicholas, Ron
Nikoley, Ingo
Nims, Joe
Nordman, Hasse
Ogajanov, Rudolf
Olafsson, Gylfi
Olen, Robert
Olson, Tim
Oommen, T.V.
Oriti, Samuel
Ortiz, Angela
Paik, Henry
Paiva, Gerald
Papp, Klaus
Park, Moo Geun
Parkinson, Dwight
Patel, Sanjay
Patel, Dhiru
Patni, Prem
Patwardhan, Jayant
Perkins, Mark
Pink, Tony
Platts, Donald
Ploetner, Christoph
Polishchuk, Izyaslav
Poulin, Bertrand
Powell, Paulette
Powell, Lewis
Powers, Dick
Prevost, Thomas
Psyck, Rip
Rahmatian, Farnoosh
Rajadhyaksha, Mangesh
Rave, Martin
Ray, Jeff
Raymond, Timothy
Razuvayev, Sergiy
Recksiedler, Leslie
Rega, Chris
Rensi, Randolph
Restaino, Mario
Revelle, Ryland

Rezai, Hossein
Riboud, Jean-Christophe
Richardson, James
Roberts, Mark
Rojas, Alex
Romano, Ken
Rosselli, Girolamo
Runewicz, John
Sahr, Christina
Sampat, Mahesh
Sandberg, Peter
Sandhu, Surinder
Sankarakurup, Dinesh
Sarkar, Subhas
Scaquetti, David
Schiff, Anshel
Schuette, Christoph
Schweiger, Ewald
Serzan, Jeffrey
Sestito, John
Shah, Dilip
Sharma, Devki
Shawver, Carl
Shekelton, James
Shertukde, Hemchandra
Shteyh, Ibrahim
Silvestre, Manuel
Sim, H. Jin
Simmons, Nancy
Simpson, Jr., R.
Singh, Pritpal
Slovik, Thomas
Smith, Edward
Snyder, Steven
Snyder, Aaron
Sparling, Brian
Spitzer, Thomas
Spurlock, Michael
Stahara, Ronald
Stankes, David
Stein, John
Steineman, Andrew
Stenestam, Bengt-Olof
Stensland, Leonard
Stiegemeier, Craig
Stinson, David
Sullivan, Christopher
Sundkvist, Kjell
Sweetser, Charles
Swift, Glenn
Swinderman, Craig
Teetsel, Mark
Tellez, Richard
Ten Haagen, Christopher
teNyenhuis, Ed
Termini, Giuseppe
Thierry, Juan Luis
Thompson, Jim
Thompson, Robert
Tillman, Robert
Todd, Brett
Tong, Lin
Traut, Alan
Tridon, Florence
Trivitt, Donnie
Tuli, Subhash
Vailoor, Vasanth
Van Neste, Richard
Vedante, Kiran
Verner, Jane Ann
Vir, Dharam
Virelli, Greg
Vogel, Herman
vonGemmingen, Richard
Wagenaar, Loren
Wagner, Dieter
Wallach, David
Walters, Gary
Ward, Barry
Watson, Joe
Wicks, Roger
Wilks, Alan
Williams, Randy
Wolfe, Frank
Wolter, Steve
Xu, Shuzhen
Yule, Kipp
Zarmandily, Hassan
Zhang, Shibao
Zhang, Jim
Zhao, Peter
Zhu, Hanxin
Ziomek, Waldemar

Table of Contents

1.0 Chair's Report – D. J. Fallon

1.1 PES Technical Council Committees

Technical Council Committees meet at the summer PES General Meeting, so there have been no meetings to report on since the Fall 2005 Transformers Committee Meeting. Next report on Technical Council Committee Meetings will be provided for our next meeting in Montreal in October. Several ongoing activities of Technical Council and its Committees are discussed below.

1.2 PES Technical Council Activities

1.2.1 Technical Council Advisory Board

PES President John McDonald contacted all Technical Committee Chairs in February indicating that he had chosen new PES Governing Board members with the goal of bringing more Technical Committee experience and perspective into the PES Executive Committee (ExCom) and Governing Board. He indicated further that he was forming a new Technical Committee Advisory Board (TCAB) to represent Technical Committee views, needs and plans. The TCAB will report directly to John, and we will meet prior to every Governing Board Meeting in January and June. The members of the TCAB will also be invited to participate in the Governing Board Meetings through discussion, but will not have a vote. John reported further that TCAB members as of then included Stan Horowitz, Mel Olken and Robyn Taylor (participant in Transformers Committee activities). Technical Committee Chairs were asked to provide names of other Committee representatives who might be interested in participating in the TCAB.

This message was forwarded to all SC Chairs just prior to the Costa Mesa meeting. (Subsequent to our meeting Transformer Committee member Derek Foster volunteered and has been accepted into the TCAB)

1.2.2 Policy Development Coordinating Committee (PDCC)

The PDCC has continued its work on development of a PES Policy Statement on Energy and Environment. The most recent draft of this Statement follows:

IEEE POWER ENGINEERING SOCIETY
POLICY STATEMENT ON ENERGY & ENVIRONMENT
(Prepared by the IEEE-PES Policy Development Coordinating Committee)

This policy statement is concerned with the increase in the production, delivery and use of electrical energy, and its effect on the environment.

Abundant and economic energy is a key part of modern society. The harnessing of energy, and in particular the use of electrical energy to replace human effort, has led to the high standard of living today in the developed countries. Continued growth in the services that energy can provide will allow for new levels of improved quality of life, particularly in developing countries. Because of these factors, energy is a global and commercial priority.

The IEEE Power Engineering Society encourages governments to promote research, development, commercialization, and utilization of energy as parts of comprehensive, national energy strategies based on:

- Developing economic new sources of supply
- Developing the delivery infrastructure to meet changes in demand and supply
- Improving energy efficiency in the production, delivery, and customer end use chain
- Having due concern for the environmental impacts of energy developments.

While energy use will grow, prudent development must seek methods to minimize the negative effects of energy production, delivery and use, and must aim to reduce global dependence on fossil fuels. No single solution fits all situations. A comprehensive energy policy must consider all of the available options in an appropriate manner. The role of the customer in energy choice and usage should be recognized. The value of diversity of energy resources and of technologies must be recognized, and over-dependence on any single fuel or energy source should be avoided where reasonable. The finite nature of environmental and ecological resources must also be recognized. These resources must be managed wisely for current and future generations.

If you have comments or questions related to this proposed PES policy statement, please see the Committee Chair.

1.2.3 Technical Sessions Committee

The Vice Chair's Report contains information on papers and panel sessions to be presented at the PES T&D Conference and Exposition (re-scheduled from last October in New Orleans to May 2006 in Dallas) and the PES General Meeting in Montreal in June 2006. The Chair notes with appreciation that several members and active participants in the Transformers Committee have authored papers and will be presenting at the Dallas T&D Conference and Exposition.

The 2006 Power Systems Conference and Exposition (PSCE), with the theme "New Solutions for New Challenges", has been scheduled for October 29 – November 1, 2006 in Atlanta. Excerpting from the PSCE website (http://www.pscexpo.com/):

PSCE will bring together an international group of power systems engineers, operators, planners, policy makers, economists, academics and others with interest in the profession. The conference will begin with a timely and valuable plenary session and will also include tutorials on the most up-to-date topics on power systems. In addition, the conference will comprise an outstanding combination of technical paper and panel sessions focusing on the following tracks:

- Track 1: Planning and Operation
- Track 2: Markets, Policies, and Economics
- Track 3: Dynamic Performance of Power Systems
- Track 4: Real-Time Applications
- Track 5: Education-Understanding Power Systems

1.3 Transformers Committee Activities

1.3.1 Association Management (AM) System

All Committee members and active participants, and all individuals interested in Transformers Committee activities, are reminded that virtually all communications on Committee meetings and activities are handled through the Committee website (http://www.transformerscommittee.org/) and through electronic media. Contact information is maintained through our Association Management (AM) system, and administration of membership and meeting attendance records is facilitated by

the AM System. All Subcommittee and Working Group Chairs are encouraged to use the AM system for assigning membership within their groups and for communication with their group members. All Committee members, active participants, and interested individuals are reminded also that you are responsible personally for maintaining the accuracy of your contact information, through the AM system, for Committee activities and communication. Updating your contact information in handwriting on a meeting roster does not result in updating your Committee contact information. Keeping your contact information maintained in the AM system assures that the Chair of any Subcommittee or Working Group you are involved with will be able to communicate with you. Details on enrolling and maintaining your contact information in the AM system can be found on the Committee website.

The AM system also allows you to check the Committee record of your membership status in individual Working Groups, Subcommittees, and the Main Committee. This can be done by checking your Personal Profile, and then clicking on Subgroup Details. If the Committee record does not match your record, please review with the appropriate WG or SC Chair.

1.3.2 Committee Membership

All are welcome to participate in the work of the Transformers Committee. Membership in the Committee provides recognition of your peers and indication to your co-workers and management of your active role in Committee work. If you are presently not a Main Committee Member, and you have been actively participating in our work for at least one full year – and can secure the acknowledgement of at least 3 Activity Chairs (WG's, but must include at least one SC Chair) affirming that participation, the Committee will look forward to welcoming you as a member. Membership requirements and application forms can be found in the Organization and Procedures Manual posted on the Committee website.

1.3.3 Acknowledgments

I extend my thanks, and the appreciation of all Committee members and participants, to Ken Hanus for his excellent leadership of the Committee over the past two years, and to Tom Prevost for having successfully completed his term as Secretary. Welcome to Tom to his new position as Vice Chair, and welcome also to Ed Smith as he takes on the new role as our Committee Secretary.

I speak for Tom, Ed, myself, and for Ken and all past Committee leadership, in indicating how very proud we are to work with each of you. Tom, Ed, and I ask your continuing support over the next two years, and we thank you for the service you perform – through your Committee work – to serve our industry, society, and the communities in which we all live.

Respectfully submitted,
Donald J. Fallon
Chair, IEEE/PES Transformers Committee

1.4 Chair's Remarks and Announcements at Main Meeting

Comments and announcements from the Chair at the start of the Main Committee Meeting on Thursday March 23 included the following:

1) Since the time of our last meeting we note with sorrow the passing of one of our active members and colleagues, Paul Orehek. Paul served as Chair of the Underground Transformers & Network Protectors SC from about 1990 to 2000, and was a cherished friend to many of us. A moment of silence was observed to honor the memory of Paul, and of all our Committee colleagues who have passed on.

2) Thanks and appreciation were provided for the continuing IEEE Staff support and presence at our meetings

3) Special thanks and appreciation were provided to Bill and Minnie Chiu for all their efforts in preparing for this meeting, and to all Bill's colleagues at Southern California Edison who assisted him in SCE's hosting of this meeting. The meeting and arrangements were declared a resounding success.

4) Thanks were also provided to the Break Sponsors – North American Substation Services, MGM Transformer Company, and Serveron - for their support.

5) ABB provided some significant financial support beyond that originally anticipated for the last meeting in Memphis, and the Chair thanked ABB for this additional support for the activities and amenities at Memphis.

6) The Committee officers acknowledge that meeting scheduling for meetings our size is a difficult task, and extends appreciation to Greg Anderson and the Meetings Planning SC for their good work. Because of the wide range of experience and interest of our members and participants, although we certainly try it is virtually impossible to eliminate all individual conflicts in desired WG and SC meeting participation. We will remain open to discussion on suggestions to minimize conflicts as much as possible. Please see Greg or the Chair if you have specific suggestions.

7) Our SC and WG Chairs perform invaluable service to the Committee in coordinating and guiding activities on the large number of standards document projects we are working on, and that leadership is greatly appreciated. Progress on projects is enhanced when meetings are held and leadership is present for all active projects at our meetings. It is especially important, once meeting scheduled have been finalized, that individual WG meetings be held as planned. Our attendees schedule their time and costs for attendance based on the schedule of expected meetings. Last minute work or personal needs can result in an activity chair cancelling plans to attend, and so all WG Chairs are urged to appoint a vice chair and/ or secretary to help assure continuity of progress if they are unable to attend. Recognizing the enhanced effectiveness of project meetings when WG leadership is present, the Administrative SC approved a proposal at this meeting to have the SC Chair at least review WG leadership if a WG Chair misses two consecutive meetings.

8) The Tutorial sessions at our meetings have been, and continue to be, a valuable means of keeping our attendees updated on current industry topics and issues. The Chair acknowledged with thanks the efforts of Tutorial session preparers and presenters past and present.

9) The Committee, in a coordinated approach with other Technical Committees and the Chair of the PES Standards Coordinating Committee, is planning an appeal to the IEEE SA Standards Board for written policy statements affirming PES use of dual dimensioning in PES standards. This appeal is directed at recognizing both the importance of the IEEE drive towards metrification and the Transformers Committee's (together with other Technical Committees') very serious concern for safety if only metric units are used in our documents. The appeal will also ask for written acknowledgement of the Technical Committee as the decision making body for issues related to standard industry terminology. Both appeals are aimed supporting SCC14 processes but minimizing negative SCC14 ballots related to metrification and terminology. Update on status of this appeal will be reported at our next meeting.

10) Questions and/or concerns have been raised related to issues of jurisdictional conflict between Technical Committees or areas where collaborative effort between Technical Committees is advisable. One example is the continuing present need to coordinate between our Committee and the Switchgear Committee to resolve negative ballot questions and allow for progress on Project PC57.142 (Guide to Describe the Occurrence and Mitigation of Switching Transients Induced by Transformer and Switching Device Interaction). Committee leadership will seek direct communication with counterparts in other Technical Committees when such issues arise. Update on status of PC57.142 will be reported at our next meeting.

11) While the Committee recognizes the need for financial support to be provided by our sponsors for our meetings, appreciates such support, and allows limited commercial notice recognition of such corporate sponsorship, all our attendees are reminded of the essential non-commercial nature of our meetings and activities. Any questions related to unintended or inappropriate commercial activities at our meetings should be brought to the attention of the Chair.

2.0 Approval of Minutes from Fall 2005 Meeting – Donald Fallon

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

3.0 Administrative Subcommittee – Donald Fallon

Chairman Donald Fallon covered the key points of the Administrative Subcommittee Meeting held on March 19, 2006. Full details of the Minutes of the Administrative Subcommittee Meeting Minutes follow.

3.1 Introduction of Members and Guests

Chairman Fallon called the meeting to order at 2:33 p.m., Sunday, March 19, 2006, at the Hilton Orange County/Costa Mesa Hotel in Costa Mesa, California. The meeting started with introductions of members and guests.

The following members of the Subcommittee were present:

Gregory Anderson	Bill Chiu	Richard Dudley
Donald Fallon	Ramsis Girgis	Ken Hanus
Charles Johnson	Thomas Lundquist	Loren Wagenaar
Donald Platts	Thomas Prevost	Fred Elliott
H. Jin Sim	Edward Smith (Ed)	Rick Ladroga
Dan Mulkey		

The following members were absent:

Frank Gryszkiewicz	Edward Smith (Jim)
Carl Niemann	
Jeewan Puri	

The following guests were present:

Christina Sahr	Angela Ortiz	Jodi Haasz

3.2 Approval of the Memphis, Tennessee Meeting Minutes

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

3.3 Agenda Review

The Agenda provided by the Chair prior to the meeting was reviewed and approved. A copy is below

IEEE/PES TRANSFORMERS COMMITTEE
ADMINISTRATIVE SUBCOMMITTEE MEETING - PRELIMINARY AGENDA
Hilton Costa Mesa Hotel, Costa Mesa CA – Room B-2 Emerald 1
Sunday March 19, 2006 - Call to Order 2:30 pm

1. Introduction of Members and Guests (:05)

2. Approval of Memphis TN Admin SC Meeting Minutes (:05)

3. Additions to and/or Approval of the Agenda (:05)

4. Meeting Arrangements, Host Report, and Committee Finances
   - 4.1 - S'06 – Costa Mesa – Bill Chiu (:05)
   - 4.2 - Meetings/Finances - GW Anderson (:10)

5. IEEE Staff - Jodi Haasz, Christina Sahr, Angela Ortiz,
   - 5.1 - Update on IEEE Issues (:10)
   - 5.2 - - MyProject and Transf. Comm. Hierarchy in new PAR submittal process (:10)

6. Committee Service Awards – KS Hanus (:05)

7. Chair's Report – DJ Fallon (:05)

8. Vice Chair's Report – T Prevost (:05)

9. Secretary's Report – Ed Smith (:05)
   - 9.1 - Membership Review (:15)

10. Break (:10)

11. Standards Report - B Chiu (:35)

12. Subcommittee Reports - Roundtable (:25)

13. Old Business (:20)
    - 13.1 - Meeting Scheduling Issues (Guidelines/Concerns)
    - 13.2 - Facilitating Standards Development Process
    - 13.3 - Other

14. New Business (:20)
    - 14.1 - Coordination and Jurisdictional Issues (PC57.142, C57.16)
    - 14.2 - Other

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

3.4.1 Meetings Arrangements

Costa Mesa Attendance

Members & Guests:	369
Companions/Spouses:	85

Future Meeting Dates:

Fall 2006	Montreal, Quebec Canada	October 22-26, 2006
Spring 2007	Dallas, Texas	March 11-15, 2007
Fall 2007	Minneapolis, MN	October 14-18, 2007
Spring 2008	TBD	TBD
Fall 2008	Porto, Portugal	TBD

3.4.2 Finances

Meeting Finances:

Balance Before Fall 2005 Meeting (Jackson)	$18,793.02
Balance Before Spring 2006 Meeting (Costa Mesa)	$1729.81

Greg is requesting from the Exec Committee, permission to apply for a debit card to our IEEE Checking account.

3.5 IEEE Staff – Angela Ortiz, Jodi Haasz, Chris Sahr

Comments from Jodi Haasz regarding new personnel at IEEE and procedures.

Christina Sahr reviewed the 4 levels of the “my Project” hierarchy:

- myProject 4 levels
  - SOC (Society)
  - SPN (Sponsoring Committee – PE/Transformers)
    - Roles include
      - Sponsor Chair (Don Fallon)
      - Standards Rep (aka. Standards Coordinator) (Bill Chiu)
  - Sub-Com/WG (Sub-Group with authority over the Project – Power Transformers SubComm)
    - Roles include
      - WG Chair (T Lundquist)
      - Vice Chair
  - PRJ (Group Responsible for the project PC 57.143)
    - Roles include
      - Ballot Designee (D Chu)
      - Alternate Ballot Designee (A Lux)
      - RevCom Designee (D Chu)
      - NesCom Designee (D Chu)

3.6 Committee Service Awards – Ken Hanus

Ken indicated that the awards report was distributed prior to this adcom meeting and it will be included in the main committee minutes.

3.7 Chair's report – Donald Fallon

The Chair's report is included in Section 1 of the main Committee minutes.

3.8 Vice Chair's report – Tom Prevost

Tom's report was distributed prior to this meeting and is included in the main committee minutes.

3.9 Secretary's Report – J. Ed Smith

3.9.1 Membership Review

During the meeting action was taken on seven new members since the last meeting in Memphis. The following applications and Committee membership was approved for:

• David N. Makinson	Intron Inc.	Producer
• Aaron F. Snyder	Intron Inc.	Producer
• Lee Matthews	Howard Industires Inc.	Producer
• Robert C. Olen	Cooper Power Systems	Producer
• Larry J. Davis	Reuel Inc.	Producer
• Richard Hollingsworth	Howard Industries Inc.	Producer
• Derek Foster	Olsun Electrics Corp.	Producer

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

The classification Corresponding Member needs to be defined in the next update of the Committee O&P Manual. This classification should hold the same status as that of regular Member. Membership, including changes made at the Jackson meeting now stands at:

Members -	196
Active :	176
Life Members	12
Corresponding Members -	1
Emeritus Members -	7
Active Participants	245
Interested Individuals	331

The committee database is now fully converted to the 123sign-up committee AM system.

3.9.2 New Member Application

New applications for Committee Membership have been submitted for:

• David S. Blew	Public Service Electric & Gas	User
• Kipp J. Yule	Bechtel Power	User
• Craig Swinderman	Mitsubishi Electric Power Products	Producer
• John Graham	Trench UK Limited	Producer

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

3.9.3 Committee and Subcommittee Directory Rosters

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

3.9.4 Meeting Minutes

The minutes of the Memphis Fall 2005 transformers committee meeting were posted to the committee website on Tuesday, March 14, 2006.

The minutes of the Memphis Fall 2005 meeting were mailed on March 13, to those who ordered printed copies during meeting registration. 75 registrants ordered printed copies of the Minutes. The cost of previous minutes were:

Raleigh (Spring '03)	$3946.82	
Pittsburgh (Fall '03)	$714.27	
San Diego (Spring '04)	$1481.77	(78 @ $13.60 ea. + $357.17 postage)
Las Vegas (Fall '04)	$1084.56	(60@ $12.76 ea. + $319.17 postage)
Jackson (Spring '05)	$661.44	
Memphis (Fall '05)	$643.07	(Mailing $468.07 + Copy $175)

Subcommittee Chairs are requested to submit their SC Minutes for the Costa Mesa Meeting by June 15, 2006. Minutes should be submitted via e-mail to the Secretary (edsmith@ieee.org), with a copy to Susan McNelly (sjmcnelly@ieee.org) for posting on the Committee website. The submittal should be formatted in Word 2000 (or earlier versions) and it would be appreciated if the Minutes were put in the format as shown in the present assembled Minutes, with numbering as indicated in Main

Committee Meeting Agenda. Please indicate total attendance count for each Subcommittee, Working Group, and Task Force meeting in your Minutes. Please do not send a copy of the attendance listing for this attendance count. If a SC Vice-Chair, Secretary, or other SC member is preparing the SC Minutes, please let them know these details about Minutes submittals.

3.10 Standards Subcommittee – B. Chiu

Bill Chiu reviewed his report, which is included in the Committee meeting minutes.

3.11 Round-Table: Subcommittee Activities - Subcommittee Chairs

3.11.1 Distribution Transformers – Ken Hanus

Nothing to Report.

3.11.2 Bushings – P. Zhao

Nothing to Report.

3.11.3 HVDC Converter Transformers & Smoothing Reactors - Richard Dudley

No Report Submitted

3.11.4 Dry-Type Transformers – Chuck Johnson

Nothing to report.

3.11.5 Instrument Transformers - J. E. Smith

No report.

3.11.6 Performance Characteristics – R. S. Girgis

No Report Submitted

3.11.7 Meetings & Planning - Greg Anderson

No Report Submitted

3.11.8 Dielectric Tests - L. B. Wagenaar

Nothing to report.

3.11.9 Audible Sound and Vibration – Jeewan Puri

No Report Submitted

3.11.10 Underground Transformers and Network Protectors – C. Niemann

Not Present.

3.11.11 Insulating Fluids – R. Ladroga

Nothing to report

3.11.12 Insulation Life – D. W. Platts

Nothing to report.

3.11.13 Power Transformers – T. Lundquist

No Report Submitted

3.12 Old Business

Meetings Scheduling Issues

Don requested any scheduling concerns be relayed back to the Administrative SC for review and change consideration.

Facilitating Standards Development Process

The make-up of NESCOM changes somewhat and personal preferences are interjected into our Standards process. PAR's originally submitted with a specific title was rejected after new members joined NESCOM.

Christina Sahr reviewed the reaffirmation process and the method to address and review negatives

SCC14 Issues

Don reviewed the past problems we have had with SSC14 with the Metrification issue (dual dimensional format) and the Terminology issue

3.13 New Business

Coordinator and Jurisdictional Issues

PC57.142 & C57.16 – How can we get jurisdiction on the standards process regarding coordination with other Coordination Committees i.e. Switchgear Committee **Business**

Attendance of WG Chairs

If a WG Chair missed two meetings the SC Chair should at lease review the commitment of the WG Chair and the progress being made with in the

New WG Char for C57.12.90

Stephen Antosz was approved as Chairman of C57.12.90 by Don Fallon

3.14 Adjournment

Chairman Fallon adjourned the meeting at 6:19 p.m.

Respectfully submitted,
James Edward Smith, Secretary

4.0 Vice Chair's Report – T. A. Prevost

The following items report on activities of PES Committees on which the Vice Chair serves as Committee representative. There has been no general meeting since our Memphis Fall 2005 meeting.

4.1 PES General Meeting in Montreal - Technical Session Tracks

The Power Engineering Society announced that its 2006 General Meeting is scheduled for June 18-22, 2006 at the Palais des congreÌs in MontreÌal, QueÌbec Canada. The conference, with its theme *Innovation and Reinvestment in Power Infrastructure*, will provide an international forum to address policy, infrastructure and workforce issues.

TechnicalProgram
Technical panel and paper sessions are scheduled each day of the conference, from Monday, 19 June through Thursday, 22 June.

Thetheme of the meeting is:
Innovation and Reinvestment in Power Infrastructure
The preferential topics are:
- ***Critical Infrastructure of the Power System***
- ***Integrating New Sources of Energy in the Power System***
- ***Design for Stability***.

4.2 Technical Paper Sessions

4.2.1 Technical Paper Session at the 2006 General Meeting

Two technical sessions sponsored by the Transformers Committee are planned with 10 Proceedings papers to be presented during the IEEE/PES 2006 General Meeting in Montreal. The session is presently scheduled as follows:

TRANSFORMERS I - ANALYSIS OF PERFORMANCE CHARACTERISTICS (paper session)
Wednesday, June 21, 2006 9:00 AM-12:00 PM
Sponsored By: Transformers Committee
Track: Topic 1: Critical Infrastructure of the Power System Topic
Chair 1: Thomas A. Prevost
Chair 1 Affiliation: EHV Weidmann Industries Inc.

PAPERS AND AUTHORS:
* 06GM0103, Estimation of Transformer Saturation Characteristics from Inrush Current Waveforms
  Transaction Number: TPWRD-00613-2004
  S. ABDULSALAM, University of Alberta
  W. XU, University of Alberta
  W. NEVES, Universidade Federal de Campina Grande (UFCG),
  X. LIU, University of Arkansas at Little Rock
* 06GM0220, Calculation of Transformer Saturated Leakage Inductance based on Field Test Data
  Y. NAKACHI, Chubu Electric Power Co., Inc.
  R. HATANO, Chubu Electric Power Co., Inc.
  T. MATSUBARA, Chubu Electric Power Co., Inc.
  Y. UEMURA, Toshiba Corporation
* 06GM1289, Performance of Various Magnetic Core Models in Comparison with the Laboratory Test Results of a Ferroresonance Test on a 33 kV Voltage Transformer
  A. REZAEI ZARE, University of Tehran

H. MOHSENI, University of Tehran
M. SANAYE PASAND, University of Tehran
S. FARHANGI, University of Tehran
R. IRAVANI, University of Toronto

* 06GM1148, SIMULATION MODEL FOR ASSESSING TRANSIENT PERFORMANCE OF CAPACITIVE VOLTAGE TRANSFORMERS
I. SULE, Federal polytechnic, Mubi
U. ALIYU, Abubakar Tafawa Balewa University
G. VENAYAGAMOORTHY, University of Missouri-Rolla

* 06GM0628, Effects of Harmonics and Compact Design to the Rating of Low Voltage Transformers
D. BRECHTKEN, University of Applied Sciences Trier
S. PEIFFERS, University of Applied Sciences FH Trier

* 06GM0337, A Novel Power Quality Conditioner Applied to High Voltage Power Systems
C. ZHANG, Huazhong University of science and technology
Q. Chen, Huazhong University of science and technology
D. Li, Huazhong University of science and technology
Y. zhao, Huazhong University of science and technology

TRANSFORMERS II - CONDITION ASSESSMENT DIAGNOSTICS (paper session)
Wednesday, June 21, 2006 2:00 PM-4:00 PM
Sponsored By: Transformers Committee
Track: Topic 1: Critical Infrastructure of the Power System Topic
Chair 1: Thomas A. Prevost
Chair 1 Affiliation: EHV Weidmann Industries Inc.

PAPERS AND AUTHORS:

* 06GM0630, A Hybrid Tool for Detection of Incipient Faults in Transformers Based on the Dissolved Gas Analysis of Insulating Oil
Transaction Number: TPWRD-00390-2004.R1
D. MORAIS, Federal University of Santa Catarina
J. ROLIM, Federal University of Santa Catarina

* 06GM0546, Localization of Partial Discharges Using UHF Sensors in Power Transformers
Z. SHEN, University of Waterloo
E. EL-SAADANY, University of Waterloo

* 06GM0851, Study of Propagation Effects of Wideband Radiated RF Signals from PD Activity
I. PORTUGUES, Institute for Energy and Environment, University of Strathclyde
P. MOORE, Institute for Energy and Environment, University of Strathclyde

* 06GM0303, Impact of Temperature on the Frequency Domain Dielectric Spectroscopy for the Diagnosis of Power Transformer Insulation
J. YEW, University of Queensland
T. SAHA, University of Queensland
A. THOMAS, University of Queensland

4.2.2 2006 IEEE/PES T&D CONFERENCE AND EXPOSITION

The Transformers Committee reviewed and approved eighteen technical papers for the Transmission & Distribution Conference & Exposition, originally planned for October 9-13, 2005 in New Orleans, LA. This conference has been re-scheduled. It will be held at the Dallas Convention Center in Dallas, Texas from May 21-24, 2006. In addition to the Conference planned presentation of

Proceedings Papers in a Poster Session, two Panel Sessions have been arranged. Transformers Committee members and participants are authors for papers in all three sessions. The Papers presently planned for this Conference include:

Poster Session Papers:

- Interoperability between Non Conventional Instrument Transformers and Intelligent Electronic Devices
- Factors in Choosing Transformer Paralleling Methods
- Measured Variability Of Performance Parameters
- Accurate Solution of Ferroresonance for a Transformer interacting with Power Line
- Condition assessment of Instrument Transformer by Partial Discharge Analysis: a Comprehensive Approach

"Transformer Application Issues" Panel Session Papers:

- Surge Protective Properties Of Medium Voltage Underground Cable
- Prediction of Transient Transfer Functions at Cable-Transformer Interfaces
- Implementation of a Predictive Maintenance System
- Simulation-Based 3D analysis for Performance Verification of Large Power Transformers
- The Field Test and Dissection of a New Type of Composite Insulated Dry Current Transformer Made of Synthetic Materials

"Progress Report on Natural Ester Fluids for Distribution and Power Transformers" Panel Session Papers:

- Tapchangers for De-energized Operation in Natural Ester Fluid, Mineral Oil, and Silicone
- Progress Report on Natural Esters for Distribution and Power Transformers
- Some Considerations for New and Retrofil Applications of Natural Ester Dielectric Fluids in Medium and Large Power Transformers
- Design and Test Experience With Natural Ester Fluid For Power Transformers
- Natural Ester Dielectric Fluid Development
- Dielectric Properties of Natural Esters and their Influence on Transformer Insulation System Design and Performance
- Distribution Utility Experience with Natural Ester Coolants
- Requirements and Expectations of Natural Ester Fluids for Application in Power Transformers

4.3 Committee Organization and Procedures Manual

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

4.4 Power & Energy Magazine Submission

The Transformers Committee needs to prepare an article for P&E magazine. The Vice-Chair will be looking for topics and volunteers to prepare this article. If you have any thoughts please contact the Vice-Chair.

Respectfully submitted,
T. A. Prevost
Vice Chairman

5.0 Transformer Standards

DATE: **March 10, 2006**

TO: **Members of IEEE Transformers Committee, March 2006 Meeting @ Costa Mesa, CA**

FROM: **Bill Chiu, Standards Subcommittee Chair**
IEEE /PES Transformers Committee

SUBJECT: **PE/TR Standards Activities since the October 2005 Meeting (Memphis, TN)**

TRANSFORMERS STANDARDS STATUS

The details of the Transformers Committee sponsored standard status are shown in the attachment entitled IEEE/PES Transformers Committee Status Report of Standards, Dated 3/10/2006.

The report is a list of all the transformer related standards under the sponsorship of IEEE Power Engineering Society Transformers Committee (PE/TR). The standards are grouped by Subcommittees and sorted by document numbers. The report also contains the active PARs under the responsible Subcommittee.

STANDARDS WITHDRAWN BY IEEE-SA

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

This document was withdrawn by the IEEE-SA at the December 2005 SA Board meeting based on the recommendation of the Transformers Committee. A new PAR has been submitted to continue the revision effort. New PAR approval is expected by the end of March, 2006.

IEEE/IEC DUAL LOGO STANDARDS

Currently there is only one document that has obtained the IEEE/IEC dual logo status:

C57.135-2001 – IEEE Guide for the Application, Specification, and Testing of Phase-Shifting Transformers Approved by the IEC TC 14 as of December, 2004. The corresponding IEC document number is:
IEC 62032 Ed. 1: Guide for the Application, Specification, and Testing of Phase-Shifting Transformers (IEEE Std. **C57.135-2001**)

There were no additional IEEE/IEC dual logo standards approved during this period. The next standard targeted for the IEEE/IEC dual logo approval process is:
C57.123 – IEEE Guide for Transformer Loss Measurement

DOCUMENTS PROCESSED BY THE IEEE STANDARDS BOARD

The following sections list all of the documents processed by the New Standards Committee (NesCom) and the Standards Review Committee (RevCom) of the Standards Board since the October 2005.

NEW STANDARDS COMMITTEE (NesCom)
EXISTING PARS – EXTENSTION & MODIFICATION
PC57.12.00 - Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
Recommendation: Defer target extension request until March 2006 pending the receipt of the appropriate request for an extension.
Note: PAR extension request submitted in February 2006. Anticipate approval from NesCom during SA Board meeting in March 2006.

PC57.12.37 - Standard for the Electronic Reporting of Distribution Transformer Test Data
Recommendation: Defer target extension request until March 2006 pending the receipt of the appropriate request for an extension.
Note: PAR extension request submitted in February 2006. Anticipate approval from NesCom during SA Board meeting in March 2006.

PC57.12.40 - Requirements for Secondary Network Transformers, Subway and Vault Types (Liquid-Immersed)
Recommendation: Defer target extension request until March 2006 pending the receipt of the appropriate request for an extension.
Note: PAR extension request submitted in February 2006. Anticipate approval from NesCom during SA Board meeting in March 2006.

PC57.12.90 - Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
Recommendation: Defer target extension request until March 2006 pending the receipt of the appropriate request for an extension.
Note: PAR extension request submitted in February 2006. Anticipate approval from NesCom during SA Board meeting in March 2006.

PC57.130 - Trial-Use Guide for the Use of Dissolved Gas Analysis During Factory Temperature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors
Recommendation: Defer target extension request until March 2006 pending the receipt of the appropriate request for an extension.
Note: PAR extension request submitted in February 2006. Anticipate approval from NesCom during SA Board meeting in March 2006.

PC57.140 - Evaluation and reconditioning of Liquid Immersed Power Transformers
Recommendation: Approve target extension request until December 2006.

NEW PARS - REVISIONS OF EXISTING STANDARDS
PC57.12.80a - Standard Terminology for Power and Distribution Transformers - Amendment 1: Definition of Thermally Upgraded Paper
Recommendation: Approve PAR for the amendment of a standard until December 2009.

PC57.13.5 - Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above
Recommendation: Approve PAR for the revision of a standard until December 2009.

P1277 - Standard General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission
Recommendation: Approve PAR for the revision of a standard until December 2009.

NEW PARS - NEW STANDARDS
PC57.151 - Sound Level Measurement Guide for Liquid Filled and Dry Type Transformers and Reactors
Recommendation: Approve new PAR until December 2009.

ADMINISTRATIVELY WITHDRAWN PARS
PC57.104 - Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers
Recommendation: Approve administrative withdrawal.

STANDARDS REVIEW COMMITTEE (RevCom)
NEW & REVISED STANDARDS
PC57.12.01/D6 (PE/TR) Standard General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid-Cast and/or Resin Encapsulated Windings
Recommendation: APPROVE

PC57.12.44/D2.1 (PE/TR) Standard Requirements for Secondary Network Protectors
Recommendation: APPROVE [Vote: Yes=12; No=0; Abstain=1 (Karady)]

REAFFIRMATION
1538-2000 (PE/TR) IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Filled Transformers

Recommendation: APPROVE

C57.19.01-2000 (PE/TR) IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings
Recommendation: APPROVE

C57.116-1989 (R2000) (PE/TR) IEEE Guide for Transformers Directly Connected to Generators
Recommendation: APPROVE

5-YEAR REVIEW

638-1992 (R1999) IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

1276-1997 IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Power Transformers
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

1388-2000 IEEE Standard for the Electronic Reporting of Transformer Test Data
Sponsor requests administrative withdrawal.
Recommendation: Administrative withdrawal

C57.12.00-2000 IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers
Sponsor will submit a PAR extension request for PC57.12.00 to NesCom.
Recommendation: Extend until the expiration of the PAR for PC57.12.00.

C57.12.40-1993 Standard for Requirements for Secondary Network Transformers - Subway and Vault Types (Liquid Immersed)
Sponsor will submit a PAR extension request for PC57.12.40 to NesCom.
Recommendation: Extend until the expiration of the PAR for PC57.12.40.

C57.12.70-2000 IEEE Standard Terminal Markings and Connections for Distribution and Power Transformers
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

C57.12.90-1999 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
Sponsor will submit a PAR extension request for PC57.12.90 to NesCom.
Recommendation: Extend until the expiration of the PAR for PC57.12.90.

C57.94-1982 (R2000) IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

C57.104-1991 IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers
Sponsor requests administrative withdrawal.
Recommendation: Administrative withdrawal

C57.105-1978 (R1999) IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

C57.109-1993 (R2000) IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration

Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

C57.120-1991 (R2000) IEEE Loss Evaluation Guide for Power Transformers and Reactors
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

C57.121-1998 IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

C57.134-2000 IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers
Sponsor states that a reaffirmation ballot is in progress.
Recommendation: Extend until December 2006.

PARS DUE TO EXPIRE AT THE END OF 2006

P32 IEEE Standard Requirements, Terminology, and Testing Procedures for Neutral Grounding Devices

PC57.12.00 IEEE Standard General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers (Development of D3 complete. Recirculation pending WG final vote on D2 ballot resolution)

PC57.12.10 Standard Requirements for Liquid-Immersed Power Transformers

PC57.12.36 Standard Requirements for Liquid-Immersed Distribution Substation Transformers

PC57.12.37 Standard for the Electronic Reporting of Distribution Transformer Test Data
(Final recirculation and RevCom submittal in progress)

PC57.12.40 Requirements for Secondary Network Transformers, Subway and Vault Types (Liquid-Immersed)
(Final recirculation and RevCom submittal in progress)

PC57.12.90 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
(Development of D3 complete. Recirculation pending WG final vote on D2 ballot resolution)

PC57.98 IEEE Guide for Transformer Impulse Tests

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

PC57.130 IEEE Trial-Use Guide for the Use of Dissolved Gas Analysis During Factory Temeprature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors (Seeking PAR extension)

PC57.140 Evaluation and Reconditioning of Liquid Immersed Power Transformers
(D14 Ballot resolution in progress)

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

If there is no response by **16 October 2006**, the projects will be recommended for administrative withdrawn at the December 6, 2005 IEEE-SA Standards Board meeting.

STANDARDS DUE TO EXPIRE AT THE END OF 2006

IEEE 638 IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations (Reaffirmation ballot in progress)

IEEE 1388 IEEE Standard for the Electronic Reporting of Transformer Test Data (Replaced with PC57.12.37)

IEEE 1538 IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid Filled Transformer (Reaffirmation in progress)

C57.12.00 IEEE Standard General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers. (D3 recirculation in progress)

C57.12.59 IEEE Guide for Dry-Type Transformer Through-Fault Current Duration

C57.12.70 IEEE Standard Terminal Markings and Connections for Distribution and Power Transformers (Reaffirmation in progress)

C57.12.90 IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers (D3 recirculation in progress)

C57.16 IEEE Standard Requirements, Terminology, and Test Code for Dry-Type Air- Core Series-Connected Reactors

C57.19.01 IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings (RevCom packaged submitted)

C57.94 IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers (Reaffirmation in progress)

C57.105 IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems (Reaffirmation in progress)

C57.109 IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration (Reaffirmation in progress)

C57.116 IEEE Guide for Transformers Directly Connected to Generators (Reaffirmation in progress)

C57.117 IEEE Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems

C57.120 IEEE Loss Evaluation Guide for Power Transformers and Reactors

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

C57.134 IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers (Reaffirmation in progress)

NEW myBallot INVITAION TO BALLOT STATUS – SORTED BY INVITATION NUMBER (As of 3/7/2006)

Draft # -- <Filename>	Stage	Ballot Designee	Invitation Start	Invitation Close	Response Count
638-1992	Submitted To Revcom	THOMAS G LUNDQUIST	4/25/2005	5/25/2005	49
C57.12.70-2000	Submitted To Revcom	STEPHEN D SHULL	10/6/2005	11/11/2005	150
C57.134-2000	Submitted To Revcom	PAULETTE A PAYNE	10/5/2005	11/4/2005	96
PC57.127	PreBallot	JOHN W HARLEY	2/2/2006	3/4/2006	81

EXISTING ELECTRONIC BALLOT STATUS – SORTED BY BALLOT NUMBER (As of 3/7/2006)

Ballot Number	Sponsor (Soc/Com)	Type of Ballot	Ballot Opened	Scheduled. Close Date	# Ballots	Balloting Results			Type of Ballot
						Affirm	Neg	Abstain	
PC57.12.37/D11d	PE/TR	Recirc	8-Nov-05	18-Nov-05	78	96%	4%	3%	Electronic
PC57.12.44/D2.1	PE/TR	Recirc	22-Sep-05	2-Oct-05	53	98%	2%	1%	Electronic

NEW myBallot BALLOT STATUS – 2005, SORTED BY INVITATION NUMBER (As of 3/7/2006)

PAR or Standard #	Stage	Ballot Close Date	# of Balloters	Response Rate %	Approval Rate %	Abstain Rate %	# Comments
1538-2000	Comment Resolution	12/9/2005	100	76.0%	98.7%	1.3%	14
638-1992	Submitted To Revcom	2/23/2006	49	81.6%	94.7%	5.0%	1
C57.105-1978	Comment Resolution	2/28/2006	139	77.0%	95.2%	2.8%	102
C57.109-1993	Comment Resolution	10/4/2005	122	76.2%	98.9%	3.2%	5
C57.116-1989	Comment Resolution	2/24/2006	124	75.8%	98.9%	3.2%	33
C57.12.70-2000	Submitted To Revcom	7/27/2005	150	84.7%	99.2%	0.8%	3
C57.120-1991	Comment Resolution	3/2/2006	131	75.6%	100.0%	6.1%	5
C57.121-1998	Failed	12/15/2005	105	67.6% / 8	100.0%	2.8%	8
C57.134-2000	Submitted To Revcom	7/21/2005	96	75.0%	98.6%	4.2%	26
C57.136-2000	Comment Resolution	10/23/2005	78	75.6%	100.0%	3.4%	5
C57.19.01-2000	Comment Resolution 1	2/26/2006	79	81.0%	93.7%	1.6%	1
C57.94-1982	Comment Resolution	1/4/2006	117	75.2%	90.7%	1.1%	71
PC57.106	Comment Resolution	10/6/2005	139	84.2%	93.0%	0.9%	91
PC57.12.01	Comment Resolution 2		129	84.5%	93.1%	5.5%	14

PC57.127	PreBallot		81				
PC57.140	Comment Resolution	10/26/2005	157	86.0%	96.0%	6.7%	226
PC57.142	Comment Resolution	9/8/2005	145	79.3%	79.4%	5.2%	439
PC57.19.03-1996_Cor_1-20xx	Comment Resolution 1	10/14/2005	59	86.4%	100.0%	7.8%	1
PC57.12.36	Ballot	3/17/2006	106	49.1% / 28	94.0%	1.9%	22

2006

IEEE Standards Association Meeting Schedule

Jan 2006

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

Feb 2006

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Mar 2006

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Apr 2006

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May 2006

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Jun 2006

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January

30 **CAG Telecon**

February

17 **Draft and PAR Submission Deadline**

19 **BoD/ExCom - Scottsdale, AZ**

22 **SA-BoG Caucus - Piscataway, NJ**

23 **SA-BoG Meeting - Piscataway, NJ**

24 **SA-BOG Meeting - Piscataway, NJ**

March

14 **SA-CAG Meeting - Emb.Suites/Pisc.**

15 **SA-CAG Meeting - Emb.Suites/Pisc.**

27 **StB Committee Mtgs - Piscataway, NJ**

28 **StB Committee Mtgs - Piscataway, NJ**

29 **StB Committee Mtgs - Piscataway, NJ**

30 **Standards Board Meeting - Piscataway, NJ**

April

22 **ExCom - Shanghai**

24 **SA-CAG Meeting - Beijing**

28 **Draft and PAR Submission Deadline**

June

6 **StB Committee Mtgs - Piscataway, NJ**

7 **StB Committee Mtgs - Piscataway, NJ**

8 **Standards Board Meeting - Piscataway, NJ**

12 **CAG Telecon**

25 **BoD/ExCom - Minneapolis, MN**

27 **SA-Bog Caucus - Piscataway, NJ**

28 **SA-BoG Mtg - Piscataway, NJ**

29 **SA-BoG Mtg - Piscataway, NJ**

August

4 **Draft and PAR Submission Deadlines**

29 **SA-CAG Meeting - Santa Clara**

30 **SA-CAG Meeting - Santa Clara**

September

13 **Joint Reception/Forum PCIC and StB - Philadelphia, PA**

14 **StB Committee Mtgs - Philadelphia, PA**

15 **StB Committee Mtgs - Philadelphia, PA**

16 **Standards Board Meeting - Philadelphia, PA**

October

12 **SA-BoG Teleconference**

16 **Draft and PAR Submission Deadline**

November

19 **BoD/ExCom - New Orleans, LA**

29 **SA-CAG Meeting - Florida**

30 **SA-CAG Mtg and SA BoG Caucus - Florida**

December

1 **SA-BoG Meeting - Florida**

2 **SA-BoG Meeting - Florida**

3 **SA Awards Ceremony - Florida**

4 **StB Committee Mtgs - Florida**

5 **StB Committee Mtgs - Florida**

6 **Standards Board Meeting - Florida**

Jul 2006

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Aug 2006

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Sep 2006

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Oct 2006

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Nov 2006

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Dec 2006

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24	25	26	27	28	29	30
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NesCom and RevCom meet on the second day of the Standards Board meetings.

As of 26 January 2006

2006 STANDARDS BOARD MEETINGS SCHEDULE AND SUBMITTAL DEADLINES

Meeting Dates	Deadline for Submittal of PAR (1) or Draft Standard (2)
March 29, 2006	February 17, 2006
June 7, 2006	April 28, 2006
September 15, 2006	August 4, 2006
December 5, 2006	October 16, 2006

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

For current PAR form: http://standards.ieee.org/guides/par/index.html.
Target Extension Request form: http://standards.ieee.org/guides/par/extension.html.

CURRENT LIST OF ALL OPEN STANDARDS PROJECT (FROM IEEE Website 03/07/2006)
http://standards.ieee.org/board/nes/C2-C136.html
Only PARs submitted electronically and approved since the December 1998 Standards Board meeting are listed

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

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

PC57.12.23 (PE/TR) Standard for Submersible Single-Phase Transformers; 167kVA and Smaller; High-Voltage 25 000 Volts and Below; Low Voltage 600 Volts and Below

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

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

PC57.12.34 (PE/TR) Requirements for Pad-Mounted, Compartmental Type, Self Cooled; Three Phase Distribution Transformers, 5 MVA and Smaller; High Voltage, 34.5kV Nominal System Voltage and Below; Low Voltage, 15kv Nominal System Voltage and Below

PC57.12.35 (PE/TR) Standard for Bar Coding for Distribution Transformers and Step-Voltage Regulators

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

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

PC57.12.38 (PE/TR) Standard for Padmounted Type, Self-Cooled, Single Phase Distribution Transformers; High Voltage, 34500 GrdY/19920 Volts and below, Low voltage, 480 Volts and below; 167 KVA and smaller

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

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

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

PC57.12.80a (PE/TR) Standard Terminology for Power and Distribution Transformers - Amendment 1: Definition of Thermally Upgraded Paper

PC57.12.90 (PE/TR) Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers

PC57.12.91a (PE/TR) IEEE Standard Test Code for Dry-Type Distribution and Power Transformers – Amendment 1

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

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

PC57.13.5 (PE/TR) Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above

PC57.15 (PE/TR) Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators

PC57.18.10a (PE/TR) Standard Practices and Requirements for Semiconductor Power Rectifier Transformers - Amendment 1: Technical and Editorial Corrections

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

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

PC57.91 (PE/TR) Guide for Loading Liquid Immersed Transformers and Voltage Regulators

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

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

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

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

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

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

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

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

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

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

PC57.133 (PE/TR) Guide for Short-Circuit Testing of Distribution and Power Transformers

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

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

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

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

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

PC57.148 (PE/TR) Standard for Control Cabinets for Power Transformers

PC57.149 (PE/TR) Guide for the Application and Interpretation of Frequency Response Analysis for Oil Immersed Transformers

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

PC57.151 (PE/TR) PC57.151 - Sound Level Measurement Guide for Liquid Filled and Dry Type Transformers and Reactors

6.0 Recognition and Awards – Chair: Ken S. Hanus

6.1 Certificates of Appreciation

Certificates of Appreciation have been obtained for the following persons:

Name	Service Rendered
Bill Chiu	Host, Spring 2006 Meeting, Costa Mesa
Ed Smith	Chair, Distribution Transformers Subcommittee
Chris TenHaagen	Certificate of Appreciation, Chair, WG of the Completion of C57.13.6
Vladimir Khalin	Certificate of Appreciation, Chair, WG of the Revision of C57.13.2
Dan Mulkey	Certificate of Appreciation, Co-Chair, WG of the Revision of C57.12.28
Dan Mulkey	Certificate of Appreciation, Co-Chair, WG of the Revision of C57.12.29
Bob Olen	Certificate of Appreciation, Co-Chair, WG of the Revision of C57.12.28
Bob Olen	Certificate of Appreciation, Co-Chair, WG of the Revision of C57.12.29
William Bartley	Certificate of Appreciation, Co-Chair, WG Completion of C57.146
James Goudie	Certificate of Appreciation, Co-Chair, WG Completion of C57.146
Alan Wilks	Certificate of Appreciation, Co-Chair, WG of the Revision of C57.12.20
Tommy Cooper	Certificate of Appreciation, Co-Chair, WG of the Revision of C57.12.20
Frank Heinrichs	Certificate of Appreciation, Chair, WG on Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers
Frank Gryszkiewicz	Distinguished Service Award

6.2 Nominations for IEEE, PES, and Technical Council Awards

None at this time.

6.3 General Awards

None at this time.

7.0 Report of Technical Subcommittees

7.1 HVDC Converter Transformers & Smoothing Reactors S.C. (R. F. Dudley)

7.1.1 Introduction/Attendance

The S.C. met in the Balboa I Meeting Room of the Costa Mesa Hilton in Costa Mesa, California on Mar. 20, 2006 from 1:45 p.m. to 3:00 p.m. There were 10 members and 11 guests present. The following are the highlights of the meeting.

7.1.2 Approval of Minutes of Last Meeting

The minutes of the S.C. meeting in Memphis were approved. The minutes of the Costa Mesa meeting will not be approved until the S.C. meets in Montreal, Quebec.

7.1.3 Activity

1. IEEE patent policy was reviewed; details are on the IEEE Transformers Committee website. No patents affecting the revision process of IEEE C57.129 or IEEE 1277 were noted.

2. The Chairman reported on the meeting of the Administrative S.C. on Sunday, Mar. 19, 2006.

3. Consensus of the S.C. is that the revision process of IEEE C57.129 is complete. Seismic verification will be listed as “OTHER” test for converter transformers.

4. A PAR has been approved for the revision of IEEE 1277; oil-immersed and dry-type smoothing reactors. The remainder of the S.C. meeting was spent discussing revision objectives.

   (i) RFD agreed to distribute a WORD version of IEEE 1277 to S.C. members to facilitate the revision process; selected S.C. members who have agreed to contribute to the revision process.

   (ii) Seismic verification will be included in the revision of IEEE 1277 as “OTHER” test.

   (iii) An informative annex will be added to IEEE 1277 re overloads and associated temperature rise test verification; similar to that included in the revision of IEEE C57.129. K. Papp and RFD will produce a draft for dry-type SMRs. Peter Heinzig will prepare a draft for oil-immersed SMRs; dissolved gas analysis will be included as well as other information from the annex on overloading in the revised converter transformer standard (IEEE C57.129).

   (iv) Per Les Rickseidler gas-in-oil relay performance in oil immersed SMRs has been an issue under line fault conditions; false trip due to vibration. Les Rickseidler will solicit more input from the HVDC Users Group; extent of the problem.

(v) Per Peter Heinzig a Cigre W.G. (A2.28) has been set up to look into converter transformer failures and includes a review of polarity reversal especially as it may relate to converter transformer failures; under consideration is a polarity reversal type test at twice the time duration of the current polarity reversal test.

(vi) NOTES added to Clause 6.11.7 in the revision of IEEE C57.129 covering the polarity reversal test for oil-immersed SMRs should be added re the polarity reversal test description in the revision of IEEE 1277.

(vii) NOTES added to Table 1 in the revision of IEEE C57.129 should be added to the test summary table in IEEE 1277 for oil-immersed SMRs.

RFD will produce Draft #1 of the revision of IEEE 1277 except as noted where S.C. members will provide draft material.

7.1.4 Adjournment

The meeting ended at 3:00 p.m.
R. Dudley

7.2 Instrument Transformer Subcommittee Report (J. Smith)

7.2.1 Introduction/ Attendance

The Instrument Transformer Subcommittee met on Tues, Mar 21 at 1:45 PM.
9 members and 9 guests attended. The meeting was chaired by R. McTaggart. The previous meeting's minutes were approved as written and there were no Patent issues.

7.2.2 Working Group Reports

7.2.2.1 Working Group on Test Requirements for High Voltage Instruments Transformers Rated 115 kV and above

The WG met on Mar 21, 2006. Five members and six guests attended the meeting. It was chaired by R. McTaggart.

The agenda was approved as written.

Minutes of the Memphis meeting were also approved as written.

None of the attendees were aware of any relevant patent issues.

The following points were discussed:

- § Feedback on C57.13.5 was solicited but none received
- § A PAR has been approved, but it is for a full-use Standard, whereas the original plan was to keep it as trial use. Several members of the WG expressed concerns about this. It is expected that balloters will scrutinize it more carefully when it is full use and we can expect negative ballots and many comments.
- § Three documents which were revised based on discussions in the Memphis meeting were reviewed:

  - Annex H concerning current transformers used as unbalance current protection of capacitor banks;

  - Clause 4.5 on temperature rise of terminals;

  - Annex I on current transformers having transient performance.

Minor changes were made and these will be part of the next draft of C57.13.5.

7.2.2.2 PAR P1601 Optical Current and Voltage Sensing Systems

There was no report from this WG in the SC meeting but it had met on Mar 20th and the following are the minutes of that meeting:

Session chaired by: F. Rahmatian (TC/ITSC)
Attendees: Paul Millward, Ross McTaggart, Larry Davis, Vladimir Khalin, Chris Tenhaagen, Clayton Burns, Vuong Nguyen, Dieter Wagner, Michael Haas, Bill Henning, Rolando Gomez, Les Recksiedler, Peter Zhao, Ljubomir Kojovic, Tom Nelson.

- IEEE disclosure requirements regarding patent issues related to the WG work were presented
    - Mr. Rahmatian asked if anyone is aware of patents relating to the content of PAR 1601 work. There were no responses. It was noted that no patent or IP was disclosed or identified as relevant to P1601 work.
- Minutes of meeting #12 of P1601 at Transformers Committee meeting, Oct 24, 2005, Memphis, were reviewed and approved.
- PAR status and timetable were reviewed
    - Has been extended to 2008
    - Balloting to start in Dec 2007 or sooner (targeting Dec 2006)
- Update on other standards/industry Activities was given:
    - IEC 61850-9-2 and IEEE/UCA Guide (rev 3) for digital interface to instrument transformers
    - CSA series (Canadian Standards) to be release in Q3 2006
    - CIGRE WG A3.15 work on non-conventional instrument transformers

- Text of a preliminary draft was assigned amongst attendees for review and at least editorial feedback to Mr. Rahmatian by March 28, 2006.

pp. 1-3	Farnoosh Rahmatian
pp. 4-6	Paul Millward
pp. 7-9	Ross McTaggart
pp. 10-12	Larry Davis
pp. 13-15	Vladimir Khalin
pp. 16-18	Chris Tenhaagen
pp. 19-21	Clayton Burns
pp. 22-24	Vuong Nguyen
pp. 25-27	Dieter Wagner
pp. 28-30	Michael Haas
pp. 31-33	Bill Henning
pp. 34-36	Tom Nelson

- Several points with regards to the present draft (D04) was raised for addition or comment as follows:
    - Reference Dr. So paper on metrology and traceability
    - Table B1-B4 to be combined and completed for lower voltages (<25 kV) by C. Tenhaagen
    - It will be helpful to include a clause addressing accuracy versus temperature (both outdoor parts and indoor parts). See Clause 10.9 in the draft. Provide temperature ranges and rate of temperature change levels (5 K/hour and 10 K/hour classes).
    - It will be helpful to include some performance requirements under vibration in steady state conditions. E.g., Special Test to measure/quantify if/how vibration of CT head It will be helpful to include translates to signal.
- Next Scheduled Working Group Meetings

§ IEEE/PES General Meeting, June 18-22, 2006, Montréal, Quebec
§ IEEE/PES Transformers Committee Meeting, Oct, 23, 2006, Montreal, Quebec

7.2.2.3 WG on C57.13 Revision – Tom Nelson

This WG did not meet but it was decided in the SC to re-circulate the latest draft for comments

3. Special Presentations

Lubo Kojoic made presentations on Rogowski Coils and on IEC TC38 which were both well received.

4. Old Business

Under old business, the use of IEEE C57.113 (PD Measurement in Power Transformers and Reactors) for our Standard was discussed. It was decided that we would refer to relevant clauses in C57.13.

5. New Business

Under new business, Vladimir Khalin volunteered to provide requested information to the working group on Transformer Monitoring

6. Adjournment

The meeting was adjourned at 3 PM

7.3 Insulating Fluids Subcommittee (F. J. Gryszkiewicz, Chair; R.K. Ladroga, Vice-Chair)

Submitted By Richard Ladroga
May 11, 2006

Introduction/Attendance

The Insulating Fluids Subcommittee met in Costa Mesa, California on Wednesday, March 22, 2006 with XX members and XX guests present.

Approval of Meeting Minutes

The Minutes of the Memphis, Tennessee meeting were approved as written.

Subcommittee Membership

There were no changes to report in the Subcommittee Roster.

Current Subcommittee Business

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

March 21, 2006

From: Chair and Vice Chair of Working Group to Revise C57.106 (PC57.106)
To: IEEE Transformer Committee and IEEE Insulating Fluids Subcommittee

The Working Group for the revision of the IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment (or IEEEC57.106) met at Costa Mesa, California on Tuesday March 21, 2006. There were 4 members and 18 guests. A request for any patent disclosures received no response. The Working Group history for the last seven meetings was briefly reviewed. The Chair extended a thank you to all persons that voted on the PC57.106 ballot conducted from December 5, 2005 through January 4, 2006. The ballot received 100 affirmative votes and 7 negative votes with comments, 1 negative vote without comments and 1 abstention vote. This resulted a 93% affirmative rate. Negative ballot resolution efforts began after ballot closing and were expected to continue for an additional two weeks followed with a 10-day recirculation ballot scheduled to begin around April 10, 2006. A signup sheet was provided at this Working Group meeting for receiving, via email, the seven Power Point© presentations for the past Working Group meetings as well as the IEEE San Diego panel presentation on moisture in transformers. It was suggested that they also be posted on the IEEE Transformer Committee/Insulating Fluids Subcommittee web site and a request will be submitted to post them in Adobe Acrobat© format.

Respectfully submitted,

Jim Thompson, Chair PC57.106 Working Group
TV Oommen, Vice Chair PC57.106 Working Group

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

Costa Mesa, California
Tuesday, March 21, 2006
Minutes of WG Meeting

The meeting was called to order by Rick Ladroga at 1:50 pm, Tuesday, March 21, 2006. Due to the WG starting with a new PAR, there are presently no WG members. There were 85 guests plus the Chair, Vice-chair, and secretary present with 34 guests requesting membership.

Guests requesting membership were:

Oscar BelloPaul BomanArnold CalrosJuan CastellanosDon CherryBill ChiuDon ChuClair ClaiborneBill Darovny Don DuckettJim DukarmPierre FeghaliGeorge ForrestJames GardnerDavid GoodwinJim GrahamBill GriesackerJack Hammers Iqbal HussainJoe KellyTerence LeeStan LingrenKent MillerDan MorganMark Perkins Don PlattsTom Prevost T i m RaymondJin SimBrian SparlingRobert TillmanDavid WallachBarry WardJim Zhang

Rick went over the history of the Guide. The PAR for revision was established in 1996, and was extended in 2000, 2002, and 2004. There were some significant negative ballots during the balloting process. Due to the comments that were outstanding, a decision was made in Memphis to withdraw the standard. A decision to withdraw the 1991 Guide was made at the same time. Therefore, at this time, there is no approved guide available.

A new PAR has been filed to start over with the guide. A proposal was made to make minor changes to the 1991 Guide that would allow it to be put out for use, and then start an immediate new revision to cover the issues that were raised during the recent ballot.

Rick requested a motion to approve the minutes from the Memphis, October 2005 meeting. The motion was passed.

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

Rick again indicated that he proposes that we revisit the 1991 Guide, decide what needs to be changed, and get it sent out for comment and ballot.

Brian Sparling from GE Syprotec gave a presentation prepared by Claude Beauchemin on the gas-in-oil limits for C57.104 D11d. Table 1 and section 7.3:

Brian recommended that additional data from the other laboratories be requested to have a larger sample size for determining what the values in Table 1 should be.

The CO question – do we need to discriminate between sealed and breather type transformers? Sealed units were assumed to have a ratio of O/O+N of <5%, breather type were assumed to have a ration >15%. Based on the data provided, (3-1 ration of ppm of CO in sealed versus breather type units) the conclusion of his presentation is that there does need to be a classification made as to whether the unit is a sealed or breather type unit.
A pdf of Brian's presentation will be posted on the web site. Samples were all taken from units in service, not failed units. The samples were a mix of industrial and utility larger units, not pole top type units.

Jim DuKarm discussed his experience with gas-in-oil limits and indicated that he was seeing similar values that Jerry presented. He provided some suggestions on the direction that the C57.104 Guide can go. He supported the idea of getting a useable document out there for people to use and then start working on getting the other issues resolved and incorporated into the Guide. He had the following suggestions for changes for the interim document:

- Table 1 needs to be revised and updated.
- Table 1 disclaimers are routinely ignored and need to be made more visible.
- Take the Rogers Ratio method as published in 1978. The one in the Guide was an attempt to summarize and in effect some cases were left out.

- Correct the typos and factual errors, these should be minor.

His suggestions for the new document:

- Use screening to separate the data into different probability groups.
- Outline a DGA fault detection and risk evaluation based on changes that indicate a real fault.
- In 1991 the Duval triangle was not well known, statistical studies show that the Duval triangle outperforms Rogers Ratio.

Jim indicated that he is willing to help with the revision of the Guide. His handout will be posted on the web site.

Jerry Corkran from Cooper gave a Carbon Oxides "Lockie" presentation. This will be posted on the web site.

- break -

Rick requested by show of hands how many would like to pursue reviving Draft 12? Only one person indicated they would prefer this option. No one indicated a desire to start from scratch on a new Guide.

Rick requested by show of hands how many would like to pursue the option of minor modification to get a working copy out as quickly as possible and then start an immediate revision. A majority of those present preferred this option.

Issues to resolve for the interim Guide to get something out and available for use.

Table 1

- Numbers for C2H2 (acetylene). These numbers should be dropped considerably lower. Rick suggested as low as 2 ppm for condition 1, but with a note that any time the initial value appears should be considered for investigation. Rick asked for any suggestions for the four levels. Jim Thompson suggested using the limits proposed by TV Oommen as follows:

Condition 1: less than 10 ppm

Condition 2: 10 – 20 ppm

Condition 3: 20 – 50 ppm

Condition 4: above 50 ppm

Jin Sim suggested the level for Condition 1 should be 0 or non detectable. His concern was for a first time test on a unit, he would want to know if there was any acetylene, where it was coming from. Otherwise he could live with whatever was decided for the remaining 3 conditions.

A suggestion was made by George Forrest to abandon the four conditions and go with a cutoff value that indicates additional investigation be done. Rick indicated that if we start making too many changes, it may not get out quickly and may not be accepted.

Don Platts indicated that if we intend to get a document out in a short timeframe, we need to leave the table as is with new more applicable values and then take on the task of how to deal with the misuse of the table in the next revision.

Jim Dukarm indicated that TV Oommen had a good suggestion that perhaps if the table is used by people for more than just an initial evaluation of a transformer, that perhaps we should modify the way that we indicate the table should be used to fit how it is actually being used.

Proposed Acetylene limits with a footnote indicating that the numbers are based on actual data:

Condition 1: 1 ppm

Condition 2: 2 - 9 ppm

Condition 3: 10 - 35 ppm

Condition 4: >35 ppm

Need to come up with more appropriate levels for CO and CO2 and to deal with the oil volume issue.

Due to lack of time, these values will be developed off line and sent out to the WG for review and comment.

The meeting was adjourned at 4:30 pm.

Rick Ladroga
WG Chair

William Bartley
WG Vice Chair

Respectfully Submitted
Richard K. Ladroga
March 24, 2006

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

There is nothing new to report on this guide.

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

Costa Mesa, California
Tuesday, March 21, 2006
Minutes of WG Meeting

The meeting was called to order by Fredi Jakob at 11:00 am, Tuesday, March 21, 2006. There were 22 members and 41 guests present with 7 guests requesting membership.

Guests requesting membership were:

Dieter Dohnal
Jim Graham
Stan Hatch
Jim Morgan
Paul Mushill
Brian Sparling
Kiran Vedaute

Approval of minutes from the October 25, 2005 meeting was requested. The minutes were approved as written.

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

Agenda:

1. Discussion and Resolution of Doble comments regarding exceptions to gassing

2. Data - Dave Wallach and Fredi Jakob

3. WACTI LTC gassing data summary - Fredi Jakob

4. Threshold gas levels - Case Study-Fredi Jakob.

5. Discussion of revised tutorial - Fredi Jakob

6. Update from Dave Wallach on LTC type designations.

Agenda Items 1 - 5:

Fredi presented a gas concentration table supplied from Weidmann. He also presented a diagnostic ratio table, also from Weidmann. There was a clear break at the 90th percentile for the Methane, Ethane and Ethylene over Acetylene and for Ethylene over Acetylene values. Not as clear of a break for the Ethane over Methane and Ethylene over Ethane.

Fredi provided some case study information from a non-disclosed utility. Need to come up with when the ratios are applicable. At what point are the ratios valid. In the first case study presented, the ratio of Ethylene over Acetylene was quite dramatic, however the gas levels themselves were not significantly high. Evaluation of the unit indicated severe coking. How should threshold values be treated?
Comment by J. Kelly – There should be some limits.

Fredi rewrote the tutorial.

Agenda Item 6:

Presentation by Dave Wallach. Dave is recommending that the LTC contact type table provided at the last meeting, be reviewed to determine if any further variations are needed before proceeding with collecting of data. Since we can't publish LTC specific makes and models, this type table needs to be accurate enough for the user to make a determination as to what type their LTC falls under. It is expected that once the guide is published, that there would be cheat sheets in existence out and about for people to use.

Status of Data:

•James Gardner worked with Dr. Dukarm (TOA) and obtained a query that may be used by TOA users to extract their data into a comma separated value file for analysis.

•Data recently posted on the website is from GE and Weidmann-ACTI

•Data must be cateforized prior to submission using the LTC type table.
Dave proposed that the table be left as is, as there were no comments to revise it provided.
Data:
Minimum data requirements were discussed at the Fall 2005 meeting.

Path forward:

•Modify LTC Type Table based upon discussion SP06.

•Develop data guide to send to end-users to collect transformer oil analysis (TOA) data or data from other sources including type.

•Analyze data for tables in the guide.
Hartford Steam Boiler will send additional information to Dave. Tim Raymond will send his cheat sheet that he has developed to Dave.
Before adjourning, Fredi asked if there were any comments on how we are moving forward. No comments were received.
The meeting was adjourned at 11:35 am.

Fredi Jakob
Chair

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

C57.147 - IEEE Guide for Acceptance and Maintenance
of Natural Ester Fluids in Transformers

Tuesday, March 21, 2006

Costa Mesa, CA

Minutes of WG Meeting

The WG meeting was called to order at 9:30 am, on Tuesday, March 21, 2006 by the working group Chair, Patrick McShane. Vice Chair, Clair Claiborne and Secretary, Susan McNelly were also present. There were 11 members present and 33 guests, with 9 guests requesting membership.

Guests requesting membership include:

Don Chu
David Goodwin
George Frimpong
James Graham
Ron Nicholas
Martin Rave
Kjell Sundkvist
Dharam Vir
Shuzhen Xu

As required in IEEE SA Standard Boards by-law, Section 6.3.2, the IEEE patent disclosure requirements were discussed and a request was made for disclosure of any patents that may be related to the work of the WG. No new disclosures were forthcoming.

The minutes for the Fall 2005 meeting were approved as submitted and recorded on the website.

A Task Force was put together at the Fall 2005 meeting for……

Comments received since the last meeting:

We are presently working on Draft 8. Most of the comments received have been Editorial in nature.

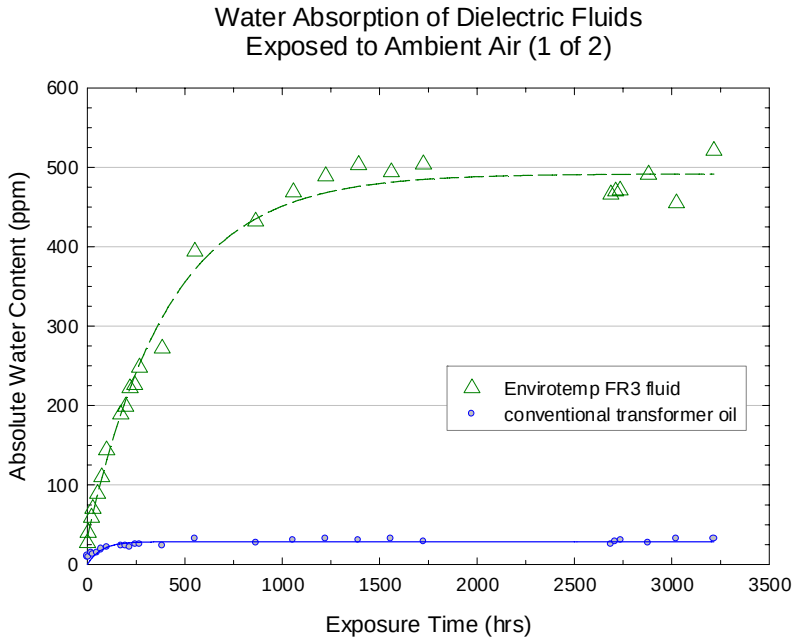
Discussed comments provided by J. Kelly and L. Dix. The following were some of the main points discussed:

1. Clause 4.6 – Since ASTM has not established a recommended acceptance value limit should the WG come up with a recommended value. The comment is appreciated, however, this has been previously discussed and it had been decided to move ahead without it. This is a guide.

2. Clause 4.13 – The same types of gases are found. The statement is not implying the the ratios are the same. Rogers Ratio does not apply. Unit that have been in service for several years have a higher ethane amount which skew the Rogers Ratio values. Need to investigate whether there is a difference between electrical and thermal faults for the volume of gas generated. TV Oomen suggested adding a reference to a Doble paper on Natural Ester properties from about 2001. Patrick will get the information on the reference. If the document is publicly available, it can be added as a reference, otherwise would be added to the Bibliography.

3. TF made up of Jerry Murphy, TV Oommen, Patrick McShane, Gael Kennedy, and Bill Griesacker have been assigned to work on Clause 4.14.

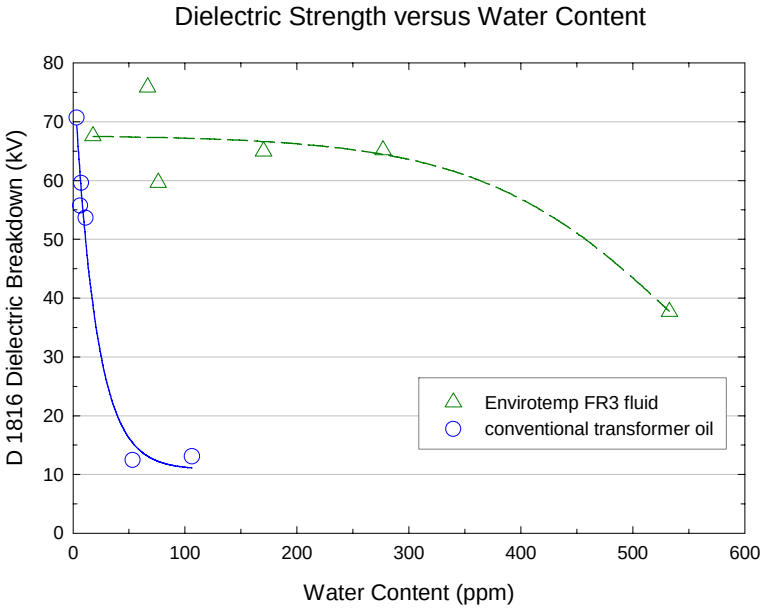
4. Clause 4.15 – Comment from L. Dix on whether it night it be beneficial to insert graphs comparing typical oil versus typical ester fluid. Patrick presented graphs of Water absorption of dielectric fluids exposed to ambient air and dielectric strength versus water content for ester fluids versus mineral oil. A TF will be formed to come up with an Annex that discusses relative saturation at different temperatures and dielectric strengths.



100% Saturation

FR3, 1100 ppm
Mineral Oil, 80 ppm

5.



100% Saturation =

FR3, 1200 ppm
Mineral Oil, 80 ppm

Will reference Doble values in Clause 4.17

A motion to make changes agreed on today. A draft will be sent out for straw ballot with results from the two TFs that need to be made. Unless there is greater than 25% rejection, we will proceed to ballot. The motion passed.

The meeting was adjourned at 9:20am.

Respectfully Submitted

Patrick McShane
Working Group Chair

Clair Claiborne
Working Group Vice-Chair
October 25, 2005

Adjournment

The Subcommittee adjourned at 12:00 noon.

7.4 Insulation Life Subcommittee – Don Platts, Chairman

The Insulation Life Subcommittee met in Costa Mesa, CA on March 22, 2006, at 8:00 AM. There were 37 members and 42 guests present, with 4 guests requesting membership in the subcommittee.

The minutes of our meeting in Memphis, TN on October 26, 2005 were approved as submitted.

7.4.1 Chair's Report

7.4.1.1 The Fall 2006 IEEE Transformers Committee Meeting will be held October 22 – 26, 2006 in Montreal, Quebec, Canada.

7.4.1.2 At this meeting, the Insulation Life Subcommittee was held at the same time as the Dielectric Test Subcommittee. A poll of the people in attendance revealed that the majority would like to attend both subcommittee meetings.

7.4.1.3 An IEEE Technical Committee has an opening for a Transformers Committee representative. The Transformers Committee is looking for a volunteer.

7.4.1.4 Metrification issues are still presenting problems to the Transformers Committee. However, the Insulation Life Subcommittee has very few problems with metrification.

7.4.1.5 The Transformers Committee organizers put in a lot of effort to minimize conflicts between Working Group and Task Force meetings. The Working Group and Task Force Chairs should avoid canceling their meetings at the last minute due to schedule conflicts.

7.4.2 Project Status Reports

7.4.2.1 Reaffirmation Ballot 1538, IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Filled Transformers

The reaffirmation ballot was approved at RevCom. The guide is valid for five more years.

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

The reaffirmation ballot will be presented to RevCom next week.

7.4.2.3 Reaffirmation Ballot C57.119, IEEE Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings

C57.119 needs to be reaffirmed by the end of 2006. Subhash Tuli will lead this effort.

7.4.3 Working Group and Task Force Reports

7.4.3.1 Working Group for the Revision to C57.91 Loading Guide - Tim Raymond

The WG meeting was called to order at 9:30 AM on Tuesday, March 21, 2006 by the working group Chair, Tim Raymond. There were 33 members present.

Approval of minutes from the October 25, 2005 meeting was requested. The minutes were approved as written.

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

Chair's Comments:

Draft 4 will be posted. We need to get back on track and wrap up the standard. All major technical changes are done. We need to clean up Draft 4 for preparation for ballot.

If anyone will be voting negative, this is the time to voice any concerns that they may have.

Specific discussions:

Clause 5.4 – Supplemental cooling of existing self-cooled transformers.

Does this clause belong where it presently is or should it be moved elsewhere? Tim made a motion to move this to a new annex, the motion was passed.

Affects of "Condition"

Include rough estimates of moisture and oxygen and apply multiplying factors to age acceleration factor for both thermally upgraded and non thermally upgraded paper. Tim calculated factors for both upgraded and non upgraded paper in a table based on Lundgaard, Emsley, and McNutt. The general question is should this be pursued, is it oversimplification, or is it about right? Tim also presented a graph from a Cigre working session comparing the aging rates for dry and wet papers.

Tim asked whether the WG feels the general concept is acceptable? Don Platts indicated he felt it was valuable, but perhaps with a caution note added regarding its use and some guidance on its use and risk associated with its use.

Comment from Tom Prevost, this needs to be the moisture at the hot spot. Moisture in bulk insulation would be different than at the hot spot.

Clause 6.4 – Normal Insulation Life

The 1995 revision avoided specifying normal life. The new revision, at some point, moved to specifying 180,000hrs as recommended normal life. Tim suggested that the guide be reverted back to the 1995 approach.

Equation 4 in the 1995 guide and Table 2 defined the normal insulation life for an insulation system. A vote was requested. Don Platts indicated that it may conflict with what has been done in C57.100. Tim indicated that we should revert back to the 1995 version and if there is a conflict with C57.100 when it comes out, it would have to be addressed on the next revision.

Tim asked if it would be worth pulling some of the background information on life expectancy into the guide. Tim requested a volunteer to do this. Tom Prevost volunteered to take this on.

TV Oommen commented on the End of Life Criteria. He will look into reinserting this table into the Guide. Need to determine if the testing that was done to determine the 65,000 at 50% tensile strength and the 180,000 value are correct with newer information that is available.

Temperature Calculations

Annex G model was moved into the main body of the guide. The old Clause 7 was then moved to the Annex instead for cases in which the bottom oil rise is not available. Tim indicated that he knows this will generate some negatives. Rather than discuss at this time, he requested that any individuals that may be voting negative on this point to contact him to discuss.

Life expectancy

Is there anything, or what should be done to make this guide more useable for distribution transformer users? Should there be simple charts or tables? A group of volunteers will look at the issue concerning distribution transformers.

Cold Load Pickup

This was formerly in an Annex and was moved to the main body. Should this be left in the main body or moved back into an Annex. It was decided that it would be moved to an Annex.

Annexes

Annex B – Question as to whether this should be in the body of the guide since it is addressed in the scope. Ruling was that it needs to be in the body of the guide and will have to therefore, be moved.

Annex E – some of this will be moved back into the main body of the guide.

Annex F – Background on gas evolution. Suggested taking relevant portions out and moving back to the main body and removing the annex.

Annex H – Hot spot temperature indicators and fiber optic detectors. Does this really belong in the guide? Tim suggested that it be struck. Comment that a reference be made to the paper being written. The information is valuable, the question is whether this is the appropriate location for the information.

Tim has requested more participation from the WG members in working on the guide. He has set up a distribution list for work to be done between now and the next meeting. Members that wish to remain members of the WG are expected to sign up and participate in discussions and provide feedback.

Meeting adjourned at approximately 10:40 am.

Tim Raymond, Chair

Glenn Swift, Vice Chair

7.4.3.2 Working Group On Thermal Evaluation Of Power And Distribution Transformers (C57.100) – Roger Wicks

7.4.3.2.1 Introduction and Rosters

The working group met on Monday, March 20, 2006 at 11:00 AM with 14 members and 50 guests attending. One guest requested membership in the working group.

7.4.3.2.2 Approval of minutes from October 24, 2005 meeting

The minutes of the October 24, 2005 meeting in Memphis were approved as written.

7.4.3.2.3 Patent Disclosure

The chairman asked if anyone knew of any patents which could pertain to this project. There were none.

7.4.3.2.4 Discussion of two methods in existing C57.100 document – Lockie Tests and Sealed Tube Tests.

Patrick McShane provided a short summary of their Aging work recently conducted which utilized the Lockie Tests and Sealed Tube Tests, which will be reviewed in more detail on the 21st, in the Tutorial titled "Aging Rate of Kraft Paper Insulation Immersed in Natural Ester Based Dielectric". This overview solicited some questions from the audience related to the makeup of the cells, as well as the moisture content of the papers in the cell. Patrick addressed the questions, and noted that they obtained a very good correlation between historical values and their testing for thermally upgraded kraft (within 2ºC).

Patrick also noted that their testing showed longer aging than predicted from the classic aging curves, especially for the ester-based fluids. Their Lockie tests were conducted with hot spot temperatures at 168, 175 and 183ºC, all of which ran significantly longer than the required aging times at these temperatures (up to 3 to 4X).

7.4.3.2.5 Discussion of DuPont-Weidmann test of Model using Thermally Upgraded Kraft

The chair and secretary then reviewed the joint work being conducted by their companies to utilize the new IEC test method (62332) which involves model cells designed to simulate the thermal performance of a power transformer. To date, this testing has been conducted with non-upgraded kraft insulation, and life curves are being generated which look to show longer life for this material than seen in either of the existing C57.100 methods.

In this testing, the bulk oil temperature is controlled at 115ºC, and the conductor temperature is independently controlled at higher temperatures. This current set of aging is being conducted with a Nitrogen blanketed cell and well-dried paper-oil insulation system, which may explain the superior life. The chair noted that subsequent work will be conducted with air blanketing and also to look at the effect of moisture.

The testing has just started with upgraded papers as well (2.74% Nitrogen) and based on a limited sample base, the incremental benefit of these papers vs. the non-upgraded papers is in the range of 10 to 15ºC. Due to the lengthy aging periods (in some cases a factor of 10 over historical sealed tube work), an original test plan to have completed this work with four different nitrogen content papers was not accomplished prior to the meeting. This testing will continue, and the other variations mentioned above will be considered as well.

The working group dealing with the gas guide expressed interest in some of the oil data from this testing, as well as the working group dealing with the loading guide. The chair will finish updating the information in the presentation, and then send it out to members of the working group. He expects to receive data on 4 or 5 additional cells during the next couple of days.

The working group seemed pleased with this work, and some good discussion points were provided, especially around the need to evaluation moisture and oxygen effects. Patrick McShane offered to help the chair understand methods to provide a controlled amount of moisture content for the start of the aging cycles. Haase Nordman provided some insight into a Finnish study which looked at moisture content vs. transformer life.

7.4.3.2.6 Work Going Forward

The aging work from the IEC Model aging will continue. Additionally, the secretary will work with IEEE (Jodi Haasz) to obtain permission to distribute copies of IEC 62332 to the working group members to help our efforts in developing a power transformer model.

The chair also noted, that as a group we need to evaluate both the existing model as well as the proposed model to understand test criteria for evaluation. During the meeting, it was noted that DP is a much more predictable indicator of remaining life than tensile strength, but the chair cautioned that not all materials can use this method (non-cellulosic as an example). We also need to consider how one qualifies a system – do all parameters have to pass, or only the solid. Is there two sets of criteria – one if the fluid is good, one if not so good, etc. Perhaps these decisions can only be made after more extensive aging is completed.

7.4.3.2.7 Adjournment

The meeting adjourned at 12:15PM.

7.4.3.3 Task Force on Winding Temperature Indicators - Phil McClure

1. The meeting convened at 9:30 AM, with seven members and 29 guests in attendance. Three persons requested to be added as members.

2. The patent instructional slides were displayed and a request for disclosure of knowledge of patent applicability to the group's work was made. There were no affirmative answers to the inquiry.

3. The Members and Guests introduced themselves.

4. The minutes of the March 13, 2005 meeting in Jackson, MI had been sent to the members and posted on the TC website and they were approved and seconded as written.

Old Business

At the last meeting in Jackson, review of the glossary of the technical paper had begun, but had not been completed. Draft 9 of the paper has been distributed to the members with the glossary completed to the point where we left off, and it was decided that further action to complete it will be done through email. Remaining action is limited to comparing our definitions to other IEEE documents, primarily IEEE 100.

New Business

1. In the ongoing review of the group's direction, and in conversations with group members it was made clear that there was a renewed urgency to expedite the completion of the paper and move along to whatever is next.

   The chair explained to the group that determining the time constant of electro-mechanical ISS WTI system is all that is required to complete the investigative portion of the paper. This step is required to answer a question that was the original impetus for the group's formation. Previously we had proposed testing transformers using step inputs to highly loaded conditions. This test plan is very costly and disruptive to insert into a normal heat-run test plan. It was suggested by the chair that we could apply proportional overload current to the heater of the thermowell during the stabilization portion of the heat run and simulate the same conditions. It was further suggested by Don Chu that applying the overload current to the heater of the thermowell from cold conditions would produce another valuable data set. The group was very receptive to both suggestions. The chair will create a test plan and circulate it to the members for comment.

   The chair then brought up suggestions from recent and past history regarding where the group should go after the paper is finished. There were four suggestions; do no further work, or produce a recommended practice, or a guide or a standard. The chair pointed out that in previous discussions a guide had been preferred, and further explained that the paper, from all previous revisions, probably had enough information to produce a guide in short order. These options were discussed, and the group seemed to favor producing a guide.

   The chair then opened discussion on how to complete the paper. Two options were discussed; take the paper private, using existing contributors as authors, or continue under the auspices of the task force. The chair explained that if it was decided to produce a guide, completion of the paper might delay that effort.

   Dave Wallach then made a motion proposing to produce a guide and to complete the paper aside from the activities of the Task Force. The motion was seconded by Phil McClure. By vote of 7 in favor and 2 opposing, the members approved producing a guide and taking the paper private.

2. Discussion then turned to revisions to draft 8 which were incorporated into draft 9.

   The chair thanked Gary Hoffman for his editing of section 1.2 sensor descriptions and asked if he thought that it might need to be reorganized. He agreed, and volunteered to do the reorganization.

   Comments on section 1.5 adherence to national standards were sought. Some areas of this section, pertinent to the creation of a guide were discussed, but it was clear that the section was not read by many of the group. Gary Hoffman pointed out that mention of two EMI / RFI standards needed to be added.

3. It was decided not to discuss any of the other sections needing authors, since those tasks will be passed on to the private authors.

4. The group was asked if there were any transformer manufacturers who would be willing to sponsor the new heat run test and two answered favorably.

The meeting was adjourned at 10:35 am.

Respectfully Submitted,

Phil McClure
Chair

7.4.3.4 Working Group for Temperature Rise Test Procedures Section 11 of C57.12.90 - Paulette Payne

The Task Force met March 21, 2006 at 8:00am in the Emerald 1 Room of the Costa Mesa Hotel in Costa, Mesa California. There were 16 members and 32 guests present. Messrs Barry Beaster and Tom Harbaugh were announced as new members; membership is now 39.

Members were provided the opportunity to identify or disclose any patents believed to be essential for the use of Clause 11.0; no patents were identified or disclosed.

The minutes from the October 24, 2005 meeting were approved.

Presentations were made on the following and are identified by the section cited in PC57.12.90/ D2 12 April 2002.

11.2.2 - Mr. Bob Ganser presented a proposal for a cooling standard curve format requiring a 10 minute data collection interval starting at time zero (when the power is taken off the system) with data points taken every 15 seconds up to 4 minutes, then every 30 seconds from the 4 to the 10 minute mark. This would generally result in 20 – 24 data points. Discussion ensued regarding the 15 second interval and if the shutdowns and data collection should be done for all three phases. Mr. Ganser suggested at least one measurement be made on all windings within 4 minutes of shutdown and that a minimum of 4 measurements be made on all windings as B-phase may not necessarily give the highest temperature rise.

11.2.2.e – Mr. Barry Beaster presented the Blume method as an example of data fitting and regression using least squares. Mr. Thang Hochanh analyzed the same data as Mr. Beaster using the IREQ method for data regression obtaining practically the same results. Calculation spreadsheets for both methodologies will be made available to the membership.

11.1.2 - Mr. Jerry Corkran presented results from temperature rise tests varying the time to re-energize. The basis for data collection was stabilization on total winding watts, testing the primary winding first; subsequently, a similar test was performed testing the secondary winding first. The winding rises obtained for both tests were similar for each winding. Mr. Don Platts addressed the proposal for time to re-energize as at the previous meeting, consensus was to return the transformer to the stabilized top oil temperature for continuing data collection when resistance measurements can not be completed in the specified time interval. Mr. Corkran stated that it is not necessary to hold the stabilized temperature at constant current for one hour in order to take additional readings. He stressed stabilization of the winding gradient (resistance measurements) and correction of the oil temperature at the time of shutdown as essential.

Old Business – Mr. Subash Tuli presented a proposal for top oil rise correction to adjust for difference in calculated and actual total losses when performing the temperature rise test with constant current.

Having exhausted allotted time, New Business could not be addressed. The meeting was adjourned at 9:15am.

Vice Chair – Juan Castellanos
Chair – Paulette Payne Powell

7.4.3.5 Task Force: on Moisture Estimation in Transformer Insulation – Jin Sim

Schedule conflicts have prevented this task force from meeting.

7.4.4 Old Business:

IEEE Standards C57.12.00 and C57.12.90 were balloted in 2002 and received many comments. Don Platts and Barry Beaster are getting editable documents and will begin addressing the comments.

7.4.5 New Business:

Don Platts and Barry Beaster discussed the effects of core over-excitation on the temperature of the core. The loading guide does not address non-current carrying parts and there is no method to calculate of hot spot temperature in the core and the core surface temperature when doing overload calculations. The core surface temperature can be important since it is generally in contact with insulation. The Subcommittee will address this issue sometime in the future.

7.4.6 The meeting adjourned at 9:15 AM

Don Platts
Chair, Insulation Life Subcommittee

7.5 Performance Characteristics Subcommittee –(Ramsis Girgis)

7.5.1 Introduction/Attendance

The Performance Characteristics Subcommittee (PCS) met on Wednesday, March 22, 2006 with 52 members and 44 guests in attendance. 11 of those guests requested membership in PCS. See last page of these minutes for attendance summary.

7.5.2 Approval of Meeting Minutes

The minutes of the last meeting in Memphis, TN were approved as written.

7.5.3 Chairman's Remarks

7.5.4 Administrative Subcommittee Notes

- Next Standards meeting dates and locations are as follows:
  Fall 2006: October 22–26, Montreal, Quebec, Canada
  Spring 2007: March 11–15, Dallas, TX
  Fall 2007: Date TBD, Minniapolis, MN
- IEEE T&D Exhibition / Conference which was to be held in New Orleans will be held May 21-26, 2006, in Dallas, TX. Two panel sessions and one Poster session on Tuesday May 23rd.
- IEEE PES Meeting: June 19 – 22, 2 transformer sessions / 10 paper presentations on Wednesday, June 21st.
- Because of some administrative issues at IEC with Dual Logo of IEEE documents, it was suggested that we postpone submitting the "Loss measurment and tolerances" Guide C57.123 for Dual IEEE / IEC Logo.
- Chairmen of TFs, WGs, and SCs need to update their membership lists.
- Those who are not members of the committee are encouraged to seek membership.
- Stephen Antosz was requested to chair the effort on the C57.12.90 revision. He accepted.
- The Administrative Subcommittee is seeking a person to represent the Transformers Committee to the IEEE/PES Standards Board.

7.5.5 Working Group and Task Force Reports

7.5.5.1 PCS WG for Continuous Revision to C57.12.90 – Mark Perkins, Chairman; Rowland James, Secretary

The PCS Working Group for Revisions to test code C57.12.90 met in Costa Mesa, CA on March 20, 2006 at 9:30 A.M. There were 70 persons in attendance, 32 members and 38 guests. Eleven guests requested membership.

Announcements

After introductions, Mark announced that the committee chairman sent an e-mail that gives instruction on viewing the slide presentation concerning patent issues. Mark then asked if there were any patent issues relating to this standard. Being none, this discussion was closed.

The minutes from the last meeting were then reviewed. Gerry Rosselli requested that item #1 of the minutes be reworded as follows.

Gerry Rosselli presented a proposed draft of section 9.5 “Zero-phase-sequence impedance tests of three-phase transformers **with interconnected windings**”. In this draft the procedure for measuring zero sequence impedance is described: Note: The highlighted text was the requested addition. The minutes were approved as amended.

Task Force Reports

1. Marcel Fortin reported on his Task Force’s progress on revision of section 11 of C57.12.90, which included a plan to improve the Short Circuit Testing section standard. Marcel made a brief presentation to the working group on the items to be considered by the task force. They plan to conduct the business via email.
2. Gerry Rosselli reported that a survey was conducted on draft 2a. There were fourteen responses, ten approved and four approved with comments. The current draft is now 2b. This draft has corrected equations, and will be surveyed with the Performance Characteristics Subcommittee before the next meeting in Montreal.
3. Mark Perkins reported that the task force on resistance measurements (section 5 of C57.12.90) met on the evening of March 19, 2006 to review and consider the recommended changes to the standard. The group prepared recommended changes to Clause 5, which will be distributed to the working group with the minutes. After the working group comments are considered, the proposed changes will be sent to the Performance Characteristics Subcommittee for survey.

Old Business

1. Review of comments on draft 2 of C57.12.90 continues.
2. Bill Chiu reported that C57.12.00 draft 3 is ready for recirculation.
3. Steve Snyder and Lin Pierce recommended removing clause 15 and place it in C57.12.00. A straw vote was taken and the result was unanimous.
4. Gupta recommended that in sub clause 8.3 “Waveform correction of no-load losses” the term “assigning each a value of 0.5 pu” because “this gives the impression that the total hysterisis and eddy-current losses is one pu which is not the case”. Ramsis Girgis recommended that we do not accept this recommendation. After a lengthy discussion the majority voted not to make this change. Steve Snyder will inform Gupta of the decision. See appendix “D” for additional details.
5. Comments from J.W. Wilson on testing a three phase transformer with a single phase source were reviewed. This included suggested revisions to figure 23. It was decided to move this section from this standard to C57.123 “Transformer Loss Measurements”. Ed teNyenhuis, who was in attendance, agreed to include this section in the guide.

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

The Working Group met on Monday, March 20 at 1:45 PM. There were 24 members and 58 guests in attendance, with the following 3 people requesting membership:

Frank Damic	Tamini Transformers
Robert Tillman	Alabama Power Company
Jim Graham	Alliant Energy

The addition of the 3 new members brings the Working Group membership to 67 .

Following introductions, the minutes from the October 24, 2005 Memphis meeting were approved as submitted. The chairman then reviewed the IEEE patent disclosure requirements. No guests or members present indicated knowledge of any patent activity applicable to our work at this meeting.

The chairman provided an update on two items of old business carried forward from the autumn meeting :

WG Item 58 **C57.12.00/D2 April 2002 Table 19, Routine, design and other tests for liquid-immersed transformers. The request is to revise and expand this table to clarify the test requirements for all transformers. This is a work-in-process that is being coordinated with the resolution of several other comments pertaining to Table 19. More will be reported on this at the next meeting.**

WG Item 63 C57.12.00/D2 April 2002 Section 5.12.2 Table 10, Nameplate information Note 11
A suggestion was received to use gallons in lieu of cubic-meters as the unit of measurement for liquid volume, as expressed in this note for nameplate data. The working group was in favor of this suggestion, but the chair has been informed that our standards must show a preference for metric units to comply with IEEE metrification policy. However, recent compromises with IEEE have allowed the use of English units as an acceptable alternative. The note will be revised for draft 3 to read as follows :

d) The volume of insulating liquid, in cubic meters (gallons), and type shall be shown for the main tank and for each liquid-filled compartment.

The Working Group then began discussing the new topics as follows:

WG Item 67 C57.12.00/D2 April 2002 Section 8.2 Table 19

This is a request to make load loss testing and resistance measurements a routine test for distribution transformers. The Distribution Transformers Subcommittee is being solicited for input - topic will be tabled in this WG until their input is received.

WG Item 70 C57.12.00/D2 April 2002 Section 6.5.1 Tank pressure requirements

This proposal is to rewrite clause 6.5.1 to drop the ASME Boiler Code reference and state that tank pressures under rated conditions shall not exceed two atmospheres absolute. Discussion on this matter led to the belief that the statement was probably inserted as a precautionary measure, that if manufacturers exceeded 2 atmospheres pressure then the boiler code would apply. The chair will follow up on this question and discuss the proposal with the commenter, and report on the issue at the next meeting.

WG Item 71 C57.12.00/D2 April 2002 Section 8.2 Routine, design, and other tests for transformers

The request is to change the word usage by deleting “all transformers” from the sentence. The Working Group agreed with the proposal, and the revised sentence will read as follows (in draft 3 revision):

“Routine, design, and other tests *shall be* made in accordance with Table 19.”

WG Item 72 C57.12.00/D2 April 2002 Section 8.2.1 Routine tests

The proposal is to change the language of this sentence - the Working Group agreed, and the revised sentence will read as follows (in draft 3 revision) :

"Routine tests *shall be* made on every transformer to verify that the product meets the design specifications."

WG Item 73 C57.12.00/D2 April 2002 Section 8.2.2 Design tests

The proposal is to change the language in this section to emphasize that design tests are mandatory tests. The commenter suggested that the word "are" should be replaced with "shall be" in the first two sentences of this clause. The Working Group approved the first suggestion but felt the word "are" should remain in the second sentence. This change will be incorporated into draft 3.

WG Item 74 C57.12.00/D2 April 2002 Section 8.2 Table 19

This is a request to review and clarify Note 1 of Table 19. Since the note pertains to distribution transformers, the Distribution Transformers Subcommittee is being solicited for input – the topic will be tabled in this WG until their input is received.

WG Item 75 C57.12.00/D2 April 2002 Section 8.2 Table 19

The proposal is to clarify the statement for impedance voltage and load loss testing. The Working Group agreed, and the revised statement will read as follows in draft 3:

"Impedance voltage and load loss at rated current and rated frequency on the rated voltage connection, and at the tap extremes of the first unit of a new design (See NOTE 1 and Note 2. For LTC units, see 8.3.2)"

WG Item 76 C57.12.00/D2 April 2002 Section 8.2 Table 19

The requested change is to add a dot in the "Other Tests" column for the resistance test of transformers 500 kVA and smaller. There was much discussion on this matter but it was not finalized, pending feedback from the Distribution Transformers Subcommittee.

WG Item 77 C57.12.00/D2 April 2002 - Clause 15, of C57.12.90 Certified test data

This proposal is to move section 15, certified test data, from C57.12.90 into C57.12.00, as a new section 8.6. The proposal was discussed in the PCS C57.12.90 WG meeting and unanimously approved. The Working Group agreed that this section, since it dictates requirements for test data, does logically belong in C57.12.00. This change will occur in draft 3.

WG Item 79 C57.12.00/D2 April 2002 Section 5.7.1 Polarity of single-phase transformers

The commenter noted that 200 kVA (one of the parameters for polarity determination) is a nonstandard size, and questions whether this was an intentional selection. No one present seemed to know where this came from, and it has been in place for so long that

there does not seem to be much interest in changing it now. However, the chairman will seek input from the Distribution Transformers Subcommittee and report at next meeting.

New Business

A statement was received from the floor requesting our Working Group to clarify how impedance voltage is stated for transformer taps – is it referenced to the tap voltage or the rated voltage of the transformer? This matter will be considered for future work by the group.

7.5.5.3 WG on Loss Tolerance and Measurement - Ed teNyenhuis, Chairman; Andy Steineman, Secretary

- 26 members and 13 guests attended with 2 guests requesting membership (Bruce Forsyth & David Scaquetti)

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

- Minutes from the Memphis Meeting held on Oct 25th, 2005 were approved.

- Report from TF for "Guide for Low Power Factor Power Measurements". This meeting was chaired by Ed teNyenhuis in the absence of Eddy So. There was nothing to report on the Low PF Power Factor Guide. The TF reviewed the C57.123 Guide for Loss Measurement for changes. These changes and the persons responsible for review of the Guide were noted in the TF minutes.

- Frequency Conversion Factors of Transformer Performance Parameters - The final wording for C57.12.00 and C57.12.90 was reviewed again by the WG. The WG agreed that with the below changes, the wording could be sent on to Dong Kim (C57.12.00) and Steve Antosz (C57.12.90):
  - Editorial change to No Load Loss example – change "-0.05(1.7-1.4) + 1.33" to "1.33 + 0.05(1.7-1.4)".
  - Chairman to find out if equation numbers are needed. If so, they will be added.
  - Chairman to prepare wording that for frequency spectrum measurement, the linear values would be correct for spectrum measurments. This wording will be confirmed with Ramsis Girgis.
  - Chairman to prepare introduction on the frequency conversion factors to send along with the wording

- C57.123-2002 – Guide for Transformer Loss Measurement – This Guide needs to re-affirmed by Dec 2007 so the WG reviewed for initial changes and assignment of responsibility as per below. The chairman will send a Word copy to everyone so that text can be edited and complied for review at the next meeting.
  - Add reference to the frequency conversion factors that will be added to C57.12.90 annex.
  - Section 3 to be reviewed by Ed teNyenhuis
  - Section 3.5.3 – Bertrand Poulin will review for changes
  - Section 4 will be reviewed by Ernst Hanique
  - Equation 7, 8 – error – the "=" should be "+"

- Remove 3.7.2 on two wattmeter method but say why it is not recommended.
- Section 3.7.3 – Strengthen the wording on using the correct voltmeter connections and add further examples (Ed teNyenhuis to prepare this)
- Section 4.5.2 – remove this and add text on why it should not be used
- Section 5, 7 – Reto Fausch will review for changes
- Section 5.3 – Bridge Method – It was decided to keep this section as it is still used for low pf loss measurement in some companies
- Section 6 – Ed teNyenhuis to review for changes
- Section 8 – Vladimir Khalin agreed to review for changes
- All will review the Bibliography for additional references
- Ed teNyenhuis will review previous WG minutes for earlier noted changes

- Figure 23 from C57.12.90 was reviewed for possible addition to the Loss Guide. This was per a request from the WG Revision to Test Code C57.12.90. The WG agreed to add this to the Guide however it will be reviewed again with the other changes to the Guide. Below are the errors in the figure:
  - Add H3, H0
  - Remove CT on H2
  - VT should be connected to H2 (not ground)
  - V connected to ground (remove N, B)

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

Acting Chairman: Phil Hopkinson Acting Secretary: Scott Choinski

The Task Force on Switching Transients Induced by Transformer/Breaker Interaction was called to order at 8:00 AM on March 21, 2006. There were 61 attendees, 22 members, 2 requesting membership and 37 guests. Reviewed the agenda for the meeting, and the IEEE patent policy. The Minutes from the October 26, 2006, meeting in Memphis, Tennessee were approved.

1. Status of C57.142 Document –Revisions proposed by Pierre Riffon

   Mr. Hopkinson discussed his experience with transformer/breaker interaction. Hopkinson noted that the transformer gets in trouble, but the circuit breaker (vacuum or SF_6) causes the problem. It occurs in Delta-connected systems, and switching times in arresters are insufficient to protect the transformer.

   Mr. Fallon updated the status of the document. Liaised with Switchgear committee and some rewrites were completed. Not all of the negatives were addressed and the document is not ready for recirculatioin. Will continue to work with the Switchgear Committee to address all of the negatives.

   Hopkinson noted that the vacuum breaker switchgear makers have indicated that vacuum switchgear does not chop current. He said that this is clearly not an accurate statement and needs to be challenged. Furthermore, a complex interaction between cable resonance from current chopping and Transient Recovery Voltage (TRV) places high frequency voltage reversals across transformer windings and produces destructive winding flashovers and failures.

2. Recent Tests and analysis by Phil Hopkinson

Reviewed Mr. Hokinson's presentation "Transformer Switching Events – A Case For Change" originally presented March 17, 2003, in Raleigh.
Reviewed Mr. Hopkinson's presention "Ping Test". This presentation is posted under the Performance Characteristics Subcommittee site. Hopkinson indicated that he and Bob Degeneff will conduct a seminar with the same materials at the April 13 meeting of Doble in Boston.

3. Switching Events
   Responsibility for correcting the transformer/breaker interaction needs to be addressed. This will require negotiations between Transformers, Switchgear and Applications Committees to develop a charter between the Power Engineering groups in IEEE. It was noted that some SF_6 switchgear actually have vacuum contactors and are insulated by SF_6

7.5.5.5 WG on Revision of C57.21- Standard Requirements, Terminology, and Test Code for Shunt Reactors over 500 KVA – Richard Dudley, Chairman

The W.G. met in the Balboa I Meeting Room of the Costa Mesa Hilton Hotel in Costa Mesa, California on Mar. 20, 2006 from 11:00 a.m. to 12:15 p.m. There were 9 members and 16 guests present. The following are the highlights.

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

   NOTE: The minutes of the Costa Mesa meeting will not be formally approved until the W.G. meets in Montreal, Quebec.

2. IEEE patent policy was reviewed as it applies to the revision of this standard. No patent issues were noted. Attendees were directed to the IEEE Transformers Committee website for more details on IEEE patent policy.

3. Draft #5, of the revision of IEEE C57.21 prepared by the Chairman, was discussed. The following are the highlights and, except as noted are related to comments provided by Ramon Garcia.

   (i) IEEE C57.12.80 and IEEE C57.12.00 will be consulted re definitions for rated voltage, maximum system voltage, maximum operating voltage. Maximum operating voltage is generic to SRs. The current definition for maximum system voltage in D#5 is a good definition of maximum operating voltage.
   (ii) Consensus is that the preferred condition for carrying out the audible sound test is at maximum voltage.
   (iii) Are definitions of voltage consistent for "delta" connected SRs as well as "Y" connected SRs?
   (iv) Re "terms in which rating is expressed" it was decided that the "end user" should define desired magnetic characteristics and that the standard should not define these characteristics. A NOTE will be added to Clause 5.2 stating that "magnetic linearity may be important re switching considerations".
   (v) The Insulation Class for oil-immersed SRs is not indicated in Table 3. Is it 120°C? The transformer standards will be consulted as well as the Chairmen responsible for revision; Subhash Tuli etc.

(vi) An enhancement of 170% will be kept for the Low Frequency Overvoltage Test. This was the consensus of utility W.G. members; AEP, APS, HQ, BCH. An enhancement of 170% is also in line with the IEC reactor standard.

(vii) Clause 10.6.3.4 will be corrected; "where specified sound level tests shall be conducted at a specific voltage other than maximum voltage".

(viii) Dong Kim of S. Cal Edison suggested that p.d. tests on oil-immersed SRs should be consistent with the methodology for power transformers. More input is requested from Dong Kim.

The Chairman stated that he had only received 3 comments to-date from his survey of the PC S.C. re D#5. More input is required. The Chairman also asked for volunteers from the W.G. to review D#5 in detail re editorials etc. Once these 2 processes are complete the Chairman will produce D#6 which should be suitable for formal IEEE ballot.

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

The working group chair opened the meeting with introductions at 1:45 on Tuesday March 21, 2006. There were 16 members and 10 guests present.

The IEEE Patent disclosure requirements were addressed. A request was made for disclosure of any patents that may be related to the work of the working group. There was no response to the request for disclosure. The minutes from the Memphis meeting were approved as submitted to the SC Chair.

Old Business

The chair thanked Ramsis Girgis for editing the abstract, key words and introduction. The introduction was reduced in length by removing descriptions of the changes that were made in the last revision, since the comments were no longer appropriate to the current revision. These changes will be added to draft 3 for review by the working group.

The chair reminded the working group of a reaffirmation ballot comment made by Ed Bertolini concerning a lack of information on neutral heating due to third harmonics. Ed felt the document did not provide sufficient information on the topic. A second ballot comment by Ajit Hiranandani suggested additional words of clarification in this clause. He also suggested a bibliography reference to his paper about sizing line and neutral conductors in the presence of harmonics. A question was raised whether sizing conductors was included in the document scope. The chair stated that while the topic was not, a reference to the methods and the paper were probably useful. The suggestion would be included in draft 3 for review by the group.

New Business

The chair thanked Ramsis for providing a marked up copy of draft 2 with suggestions for revisions and corrections. The working group members were urged to do the same after closely reading the document, since many changes were made during the process of reformatting the document. The many formulas and the associated variables should also be reviewed very carefully, since all were modified to meet the new format requirements.

The chair then noted a number of items that should be considered by the working group during review of the document:

- All tables have been numbered and titled, but a review and suggestions are requested
- All table data and calculations have been revised following consistent rules of precision and rounding
- The chair decided to retain the two table format in draft 2 for the example calculations since it more clearly separates the input data from the calculated information. All were requested to review and compare to the single table format in Annex B.
- Additional words added to the examples to explain some of the intermediate calculations should be reviewed for content and consistency.
- All reaffirmation ballot suggestions and corrections should have been incorporated in draft 2, but should be crosschecked.
- Annex D should be reviewed for upgrades. Hasse Nordman suggested that some of the graphics from IEC 61378-3 could be added to this annex. The chair will review and request permission from IEC.
- If there is a need for additional examples or if an example should be changed, the suggested revision should be sent to the chair for inclusion in the next draft so that all members may review the change.
- All papers, articles or book references that have been published since the last revision should be submitted for addition to the bibliography

The Chair asked manufacturers to review Annex C which details methods of temperature rise testing and suggested that it be updated to include the new equipment that is now available. Chuck Johnson noted that it is now possible to simply dial in the harmonics to generate a composite wave. Dhiru Patel also indicated that they have equipment that allows direct harmonic load testing and that they had tested a large range of units. Chuck and Dhiru agreed to review Annex C for appropriate upgrades. One member expressed concern that a test could become mandatory, but the chair stressed that this was the reason that testing information appears in an informative annex. He also noted that the document is a recommended practice and therefore was not mandatory.

Ramsis Girgis questioned whether the 0.8 exponent used in the equations for the Harmonic Loss Factor for other stray losses was sufficiently accurate considering more recent investigations. He noted exponents as high as 1.55. Sheldon Kennedy reminded all that the number was taken from IEC documents that were also under development at the same time the last draft was completed. Hasse Nordman related details of the testing that was the source of the IEC exponent. This testing resulted in an exponent of about 0.6, but that 0.8 was used to be conservative. The chair noted that he felt 0.8 was appropriate considering the approximate nature of the whole document. All agreed.

Hassan Zarmandily asked if the document would address core losses due to harmonics. This resulted in a lengthy discussion by a number of members and guests. Ramsis Girgis pointed out that the result could actually be a reduction in the core flux. Ramsis suggested that this was a very complex subject and that we might want to let this issue be addressed in a future standard or discussion. The chair noted that historically the document has specifically excluded voltage harmonics. However, if someone feels it should be addressed, they should provide at least the start of a paragraph that may be added to the next draft for all to consider.

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

The Working Group met on Tuesday, March 21, 2006 at 3:15 PM with 9 members and 6 guests present. Sheldon Kennedy chaired the meeting.

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

The minutes of the March 14, 2005 meeting in Memphis, Tennessee were approved, after noting one error. The meeting minutes stated that the meeting occurred on March 24, 2005 when it was October 24, 2005. This was an error in updating the minutes from the previous meeting.

The Chair announced that we were near finishing work on the Amendment to C57.18.10, which had been approved as a PAR by IEEE. Comments received during the reaffirmation of C57.18.10 required action to resolve the negative votes received. We are correcting the errors and missing or undefined terms. Technical comments will be worked on during a full revision process following the amendment revision.

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

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

Similarly, it was noted that Annex A has Tables A.1, A.2, A.3, A.4, and so on. In the hard copy there is an error in that Table A.1 is labeled Table A.11, even though there is another Table A.11 later in the Annex. Perplexing is that the PDF copy also labels Table A.1 as Table A.11; and additionally labels Table A.2 as Table A.12, and Table A.3 as Table A.13. Again the PDF and hard copy are different. These problems appear to be a problem with the conversion into a PDF which performed an automatic renumbering of the tables.

We were fortunate to have both Angela Ortiz and Jennie Steinhagen from IEEE in attendance at our previous meeting in Memphis to hear these comments. Angela and Jennie agreed to work with the Chair on the Errata to correct this problem. This was published by IEEE on January 27, 2006. The errant tables and figures were corrected and done in the same manner as they were in the original printed standard. Leaving them as they are allows C34.2, the rectifier standard that uses these same tables, to not need to be changed.

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

Subhas Sarkar brought up a new item for possible inclusion in our next revision. Some drives suppliers are specifying high impedance transformers on the order of 15 % to 25 % impedance. He feels we should have some discussion on the impact that has on the rectifier transformer.

Issues that are being discussed in the C57.110 revision were also discussed. Better agreement between the terms used in the two standards was discussed. Difficulties with the new requirements from the IEEE Styles Manual will also make the large tables in C57.18.10 difficult to manage. We may need to seek advice from IEEE staff at that time.

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

No formal meeting was held in Costa Mesa but Richard Dudley (W.G. member) met, on Wed. Mar. 22 at 9:30 a.m., with Douglas McCullough, who is a Manufacturers Representative for Post Glover Resistors, re obtaining input for the neutral grounding resistors section of IEEE C57.32. The background and objectives of this standard were presented to Doug by RFD. Doug commented that Post Glover was committed to participating in the revision of this standard.

Subsequent to this informal meeting Doug requested membership in the W.G. He stated that he would receive technical back-up from Post Glover engineers as required. In fact he promised that he would co-ordinate the drafting of the section on neutral grounding resistors. RFD promised to provide the latest draft of the revision of IEEE C57.32. RFD suggested that the completed section on neutral grounding reactors be used as a template for the neutral grounding resistors section.

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

WG PC57.149 met for the development of a guide for (FRA) in Costa Mesa, California on March 22, 2005 at 11:00 A.M. There were 31 persons in attendance, 15 members and 16 guests of which 8 guests requested membership.

The first order of business was to show the two slides regarding patents and inappropriate behavior. The minutes from the last meeting were presented and approved without comment.

The Working Group chair presented a brief report on what had been done in the last six months. The latest contributions were identified and discussed. The newly formatted Draft was introduced, and it was labeled D1. All six sections were discussed.

- **Section 1: Scope and Application** – The group decided to review the following components.

  Definitions – The 20 definitions in place are too descriptive and will be reviewed and edited for length and content. Reference links will be added when necessary.

  Test Names – Terms such as Self-Admittance will be removed from the test names. The IEEE FRA and CIGRE Group collaborate on a set of common names.

- **Section 3:** MAKING A FRA MEASUREMENT – The group decided on reformatting the connection tables. The connections will be referenced by phase and not by terminal designation. Special formatting will be used to distinguish between recommended and optional tests.

- **Section 4:** Test Records – Bertrand Poulin offered to review and edit this section. All of the information is present, however it needs better presentation.

- **Section 5: Analysis and Interpretation** – The group agreed on the basic components for this section Trace Characteristic, Trace Comparison, Relation to Other Diagnostic Tests, Failure Modes, and Modeling. It was recommended that we add a component that would address test error issues.

- **Section 6: Appendix FRA Theory** – Alan Darwin agreed to review and edit this section for length and content.

Alan Darwin made a short presentation regarding modeling. This presentation focused on the modeling work done by Dr.Zhongdong Wang from the University of Manchester. We are hoping to include some of this work in our modeling section.

Richard Breytenbach presented a CIGRE Update, which included the last meeting held in London, UK last week. The subjects from the CIGRE meeting included:

- Effects of grounding and contact resistance.
- A round table of test data interpretation experience.

The PC57.149 FRA WG plans to have an updated draft D2 at the next meeting.

7.5.5.10 TF on Core Overexcitation – Craig Steigemeier, Chairman

The fifth meeting of the Core Over-Excitation Task Force authorized by the Performance Characteristics Subcommittee took place at 3:15pm on March 20, 2006. This Task Force is charged with the identification of limits for core over-excitation and coming up with suggestions for modification of appropriate standards. There were 68 total attendees, of which 24 were members and 44 guests. Thirty (30) of the 68 attendees were first time attendees to this task force meeting. Four (4) attendees requested membership and will be added to the Task Force member roster. Tim Raymond volunteered to assist the chairman in the collection of comments to support the development of these minutes.

The following agenda for the meeting was reviewed with the attendees.

- Participant introductions
- Patent reminder
- Approve Minutes of Memphis Meeting
- Task Force Charter & Scope: Charter – Performance Characteristics Subcommittee; Scope – The impact of excitation overvoltage on the core
- Review Suggested Modifications to Standards based on discussion at the Memphis meeting

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

A discussion was opened to review the minutes from the Memphis meeting published on the Committee website. A vote was taken and the minutes were approved.

The changes to C57.12.00 (IEEE Standard General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers), Section 4.1.6 (Operation above rated voltage or below rated frequency) suggested at the Memphis (Fall 2005) meeting were reviewed in detail. The following suggestion was made for the re-write of C57.12.00, with the text in blue being additions to the standard suggested at the Memphis meeting:

4.1.6 Operation above rated voltage or below rated frequency

4.1.6.1 Capability

Transformers shall be capable of:

a) Operating continuously above rated voltage or below rated frequency, at maximum rated kVA for any tap, without exceeding the limits of observable temperature rise in accordance with 5.11.1 when all of the following conditions prevail:

1) For distribution transformers:

1a) Secondary voltage and volts per hertz do not exceed 105% of rated values.

1b) Load power factor is 80% or higher.

2) For generator step-up transformers, the primary voltage is equal to the highest generator voltage at full load as specified by the user.

3) For system tie transformers, the primary and secondary voltages are equal to the highest levels specified by the user.

4) Frequency is at least 95% of rated value.

b) Operating continuously above rated voltage or below rated frequency, on any tap at no load, without exceeding limits of observable temperature rise in accordance with 5.11.1, when neither the voltage nor volts per hertz exceed 110% of rated values.

In the case of multiwinding transformers or autotransformers, 4.1.6.1 applies only to the specific loading conditions used as the basis of design. These loading conditions involve simultaneous coordination of kVA input and output, load power factors, and winding voltage combinations [see item j) of 4.3.3]. Differences in loading and voltage regulation for various output windings may prevent simultaneous achievement of 105% voltage on all output terminals. In no case shall the kVA outputs specified for any loading condition require continuous loading of any input winding in excess of its rating.

4.1.6.2 Maximum continuous transformer operating voltage (unchanged)

4.1.6.3 Core hotspot temperature limit

To avoid the generation of gasses in the core, the core hot spot temperature should be limited to 130ºC for the condition of highest core over-excitation, full load, and the highest ambient temperature for transformers filled with mineral oil. It should be noted that the calculation for the hotspot is unique and different from the core surface temperature. The location of the core hotspot is typically in the center, or between cooling ducts, of the upper part of the core. Gas generation in this area is caused by overheating of a thin film of mineral oil.

The following comments were made during the discussion of the suggested text:

Devki Sharma – For Item 3 of revised clause 4.1.6.1, include standard values (e.g. 105%) in the event users do not explicitly specify max. voltages. TF members agreed.

Juergen Gerth – (Regarding 4.1.6.3) Is it clear what ambient temperature applies?

Craig: Rated ambients of 30ºC avg., 40ºC max. apply.

Harold Moore – Should we also have a core surface temperature limit, since core surface is often in contact with insulation materials? Craig: Correct, addressed in next slides.

Arnold Carlos – How do we verify core temperature limit? Craig: Each manufacturer must develop own method and justify to customer.

(Unknown) – suggest 120ºC in contact with insulation, 130ºC internal core

Harold Moore – Pressboard is not thermally upgraded, temperature limit should be 95ºC.

Craig – It was suggested at the Memphis meeting to set induction limits for the core. One proposal was to limit the induction at the maximum defined voltage on the system to 1.93 Tesla for step lap cores and 1.90 Tesla for non step-lap cores. Another suggestion was 1.95 Tesla for HI-B material and 1.93 Tesla for RGO material.

It was suggested by the Chairman that this may well be a design parameter that is best left to the manufacturer to decide upon depending on the customer requirements, core design and the core material. The Chairman opened up the topic to discussion by the attendees. Following are the significant comments from that discussion:
Arnold Carlos – Wouldn't temperature or noise limits set induction level?
(Unknown) – Would it be useful to set time limits for various overvoltages.
Craig – Is it OK to abandon set induction limits?
Juergen Guerth – Stated that it is not appropriate to limit flux density. Flux density and heating not directly connected (ie. cooling duct configuration)
Dennis Marlow – Agree with Juergen.
Harold Moore – Consider induction limits, since it is difficult to explicitly define conditions for temperature limit and there is not a widely accepted method for calculating core temperatures. Use induction limits as "stop gap".
Ramsis Girgis – Should make clear voltage conditions that apply to temperature limits.
VOTE: Should there be an explicit induction limit? 6 No, Majority (>30) Yes.
The Chairman noted that it was suggested at the Memphis meeting that a core hot spot temperature calculation be part of C57.12.00? The following general guideline for core hot spot temperature calculations was reviewed with the attendees:

Maximum Core Hot Spot Temperature = Maximum Ambient temperature + Temperature Rise of oil around the region of the core Hot spot at full Load + Core Temperature Rise at maximum core excitation at full Load

For three phase, three limb, Core Form Transformers, the suggested method of calculation of Temperature Rise of oil around the region of the core Hot spot is as follows:

Temperature Rise of ambient oil = 7/8 * TOP OIL RISE + 1/8 * BOTTOM OIL RISE

For cores where the core hot spot is located at the top of a wound limb, the temperature rise of the ambient oil will need to be equal to that used in the calculation of the winding hot spot temperature

For Shell Form transformers, the temperature rise of the ambient oil will need to be calculated for the oil at the inside of the phases at the top of the core

Ramsis Girgis: This is not a real core hot spot temperature calculation, but sets specific conditions for calculation.
Gary Walters: Use wording similar to winding hot spot clause.
Ramsis: This is exactly what Craig has shown in the slide. This is equivalent clause.
VOTE: Forward core hot spot "definition" to C57.12.00 WG? 16 Yes, 0 No.
Craig: Should we add limit for core surface temperature? It was suggested in Memphis that a limit on the maximum allowed core surface temperature should be added to the standard. The following suggestion for the Surface Temperature Rise of Cores was presented to the attendees:

The surface temperature rise of the core will not exceed 125ºC at rated load and at the rated MVA of the transformer and with 105 % voltage on the loaded windings at the defined load power factor. The hot spot temperature shall not exceed 130ºC.

The material used to maintain cooling ducts in the core should be capable of operating continuously at 125ºC.

The Chairman suggested that the temperature limits of the core should be part of the Loading Guide, C57.91 and that this is outside the scope of this task force.
Tim Raymond: He would not add to loading guide since there is no way to evaluate core temperature from users standpoint.
Ramsis: There are already limits for metallic temperatures in contact with insulation.

Juergen: Should differentiate use of insulation materials (as electrical insulation or mechanical spacing).
Ramsis: Need to differentiate two components to core temperature: main flux and leakage flux. Ramsis volunteered to make a first pass at wording for the surface temperature limit..

The Chairman noted that attendees in Memphis had suggested that the standard include a statement that nameplate must adequately identify the actual capacity to which the transformer was originally designed. If the transformer is capable of a greater or lesser overvoltage than that expected from the general clause of 4.1.6.1 due to the actual capacity of the generator to which it was originally connected, this must be clearly shown on the nameplate. It was also noted that the duration of the overvoltage should be included, since the impact of time will influence the development of gas
Ramsis: Every customer has different "short-term" overexcitation requirements. Should consider requirements discussed here as continuous performance requirement.
VOTE: Should consider requirements as continuous overexcitation requirements (as opposed to short-term overexcitation). 25 Yes, 6 No
Loren Wagenaar: Prevalence of short-term overexcitation in users specs indicates need for guidance.
Harold Moore: We don't know users specific needs.
Loren Wagenaar: AEP used average of other users specs. Put in simply to raise issue. Would like continuous curve. About 15 points in AEPs spec.
Ramsis: Hydrogen starts to generate at approx. 110C. Suggested 130C for worst case loading, ambient, overexcitation, then normal conditions would result in low H2 generation. We can develop curve, but is it necessary. Reason for requirement is to limit H2. This is a separate subject than short-term overexcitation.
The Chairman noted that the development of an acceptable short-term overexcitation is out of current scope of the Task Force.
Harold Moore: Suggested that the Task Force finish the current work, and the the PCS SC can set-up new Task Force to develop short-term overexcitation limits.
A significant amount of discussion took place, which in the majority was in agreement with the decision to defer short-term overexcitaiton limits to a future Task Force.
The chairman noted that it was suggested to add wording to C57.104 to address H_2/CH_4 generation. The following was suggested:
Add wording about the mechanism where H_2 and CH_4 is produced at low ppm per day with a 6-8 ratio. This is caused by moderate core overheating and it is not harmful to the transformer.
All in attendance agreed that the TF should refer this to Insulating Fluids Subcommittee responsible for revising C57.104.
Don Platts: Suggested that we should make sure that the definitions for distribution, GSU & system tie transformers are consistent with other documents. There are holes for other types of transformers. The Chairman agreed to do some research and make necessary modifications before the Montreal meeting.

7.5.6 Old Business

None

7.5.7 New Business

7.5.7.1 New Project - Short Circuit Test Guide, PC57.133, Tom Prevost

The Guide for Short-Circuit Testing was Part 2 of C57.12.90-1995. The IEEE Style Manual did not allow two parts to a Standard, so the plan was to separate it then get published under its own Standard. A new Par was issued. There were problems with the graphics that was not resolved. The document was reviewed by several members of the committee, and it was decided that the section using LVI technique will be removed. It will be cleaned up and balloted. Then the plan is to open up a new revision project to include other current diagnostic techniques such as FRA. Marcel Fortin volunteered to adopt this task into his group's work on Clause 12 of C57.12.90.

7.6 POWER TRANSFORMERS – (TOM LUNDQUIST)

The Power Transformers Subcommittee met on Wednesday, March 22nd, 2006 with 54 members and 44 guests.

The minutes from the Memphis, TN meeting were approved with no changes or corrections.

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

7.6.1 WORKING GROUP AND TASK FORCE REPORTS

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

The Task Force on revision of C57.17, Arc Furnace Transformers, was called to order at 8:00 am on Monday, March 20, 2006. There were 10 attendees.

The minutes from the Memphis meeting were approved.

A copy of PC57.17/D1 was distributed to those in attendance.

Task Force member Mr. Laszlo Kadar gave an excellent presentation on the "Application of Electric Arc Furnace Transformers". Topics covered in his presentation included:

- Types of Arc Furnace Applications: direct arc, smelting, melting, etc.;
- Typical ratings;
- Common operating stresses;
- Life expectancies; and
- Trends in ratings.

Dom Corsi reviewed the "Instructions for the WG Chair" as pertaining to "Patents and Inappropriate Topics for Discussion".

- The opportunity was provided for the WG members to identify or disclose patents that the WG member believes may be essential for the use of that standard.
- There were no responses given that specifically referenced patents and patent applications that were involved in the WG activities.

Dom Corsi briefly reviewed important changes in the following Sections:

- **Section 4, "Ratings"**
- **Section 6 "Impedance Voltage"**
- **Appendix A, "IEEE Guide for the Interpretation of Gases Generated in Electric Arc Furnace Oil-Immersed Transformers".**

The Task Force members were asked to carefully review these changes and to comment on the same.

With no other new business proposed from the members, the meeting was adjourned at 9:15am.

7.6.1.2 WORKING GROUP FOR DEVELOPMENT OF PC57.143, GUIDE

FOR APPLICATION OF MONITORING TO LIQUID IMMERSED TRANSFORMERS AND COMPONENTS- Donald Chu and Andre Lux, CoChairmen

Meeting Minutes for Working Group on PC57.143 Transformer monitoring. 8:00 AM March 20, 2006 Costa Mesa, CA

- 113 members and guests were in attendance.
- Patent issue was mentioned with no one presenting an issue.
- Review of work completed since the fall meeting:
  - Conversion of attendance tracking and email correspondence to the AM system. Members were notified that they will not receive any correspondence unless they are properly registered in the AM system.
  - Conversion of the document to comply with IEEE standards formatting.
- Review of issues resolved during the meeting:
  - Deleted several sections from Monitoring System section and redefined the scope of remaining headings in this section.
  - Assigned the task of condensing the Benefits section to Brian Sparling and Donald Chu.
  - Resolved to maintain the annex sections but only after the content is condensed further.
  - Recruited several volunteers to resolve the remaining tasks.
  - A small session will be held during the Boston Doble conference to further address the remaining tasks.
- Tasks remaining:
  - Instrument Transformer Monitoring section needs to be written. We are soliciting volunteers from the C57.13.5 WG.
  - Condense the Annex sections. We have volunteers for this task.
  - Convert the condensed annex sections to the new format.
- Remaining tasks from the fall meeting:
  - Cross check definitions in document with IEEE standard definitions: C57.12.80.
  - Check C37.10 standard for duplication of scope and eliminate those sections which overlap scope already covered in another standard.
  - Move all remaining technology specific details to an Annex including:
    - DGA Technologies/Monitoring Methods
    - Partial Discharge Technologies/Monitoring Methods
- The meeting adjourned at 9:15.

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

The Working Group for PC57.148 met on Monday from 11:00 to 12:15 with 15 members and 15 guests. 3 of the guests were added to the membership.

Work continues on Draft #4. Draft #4 was issued last year, but had not been posted on the website but Sue McNelly took care of this during the meeting. She also posted two sets of drawings that have been prepared by ABB for two OA/FA type designs, one with and one without a LTC.

The WG decided that standard control cabinet drawings should be available for 6 different types of transformers:

- OA (ONAN) w/LTC
- OA (ONAN) w/o LTC
- OA/FA/(FA) (ONAF) w/LTC
- OA/FA/(FA) (ONAF) w/o LTC
- FOA (OFAF or ODAF) w/LTC
- FOA (OFAF or ODAF) w/o LTC

A small group was assembled to review the drawings before proceeding with the next 4 designs. The intent is to have these drawings posted by IEEE and available for downloading by users. We are still working out the details with IEEE.

The schedule calls for the group to review these drawings and agree on the standard design within 2 months after the meeting. The remaining drawings can be prepared by the next meeting when the entire document with text and drawings can be reviewed. With agreement on the complete document, we should be ready for balloting by the end of this year.

Our next step is to correspond with each Negative Balloter, to explain our response and ask for a change in their ballot.

With that complete, we will submit Draft 18 for a Recirculation Ballot, in the next month or so

In December 2005, we also received a one-year extension on the PAR for PC57.140, in order to complete our work.

We adjourned at approximately 3:45pm

7.6.1.6 IEEE C57.120-1991, IEEE LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS REAFFIRMATION REPORT - Michael Lau

Meeting minutes were received, will be included ASAP.

7.6.1.7 WORKING GROUP FOR DEVELOPMENT OF PC57.150, GUIDE FOR THE TRANSPORTATION OF TRANSFORMERS AND REACTORS RATED 10,000 KVA OR LARGER –Greg Anderson, Chairman

No meeting minutes received from Greg Anderson.

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

The Working Group for Guide on Installation and Maintenance of Liquid-filled Transformers met at 01:45 PM on Tuesday March 21st, 2006. There were 45 attendees, 19 members, and 26 guests. After introductions, minutes from the October 15, 2005 meeting in Memphis Tennessee, were reviewed and approved without comment.

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

2) The Chairman provided a brief summary of activities conducted over the last year:
- A straw vote was conducted among the Power Transformer Subcommittee members with mostly editorial and some technical comments.
- Draft #9 was submitted to IEEE for editorial review.
- Two PAR revision requested have been submitted to IEEE.
  One request was to change the Title of the Guide
  From: "Guide on Installation of Liquid Immersed Power Transformer ",
  To; "Guide on Installation and Maintenance of Liquid Immersed Power Transformers".
  The other request is for time extension as the PAR is due to expires at the end of 2006.
- The contents of the Annex, Figures and Tables were reviewed by Ewald Schweiger, Jane Verner and Paulette Payne Powell and changes have been incorporated in Draft #12.

3) An issue has been brought up by Nguyen Van Nhi regarding the requirement of "soaking time" (i.e. time after unit is energized but before load is applied) for newly oil-filled transformers. He also pointed out that it would be desirable to obtain oil sample for DGA analysis during the "soak time" for future reference and possible diagnoses. After much discussion, the group agreed that such a soak time requirement be added to the Guide.

4) A question was raised regarding taking oil samples from the conservator tank. The concern is bad oil from the conservator tank could contaminate the main tank oil. Two utilities indicated they do take samples from the conservator.

5) The chairman indicated the document should be ready for open balloting in the near future.

There is no other business. The meeting adjourned at 02:45pm.

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

The Task Force on Life Tests, De-energized Tap Changers was called to order at 9:30 AM on March 21, 2006. There were 43 attendees, 21 members, 1 requesting membership and 21 guests. Reviewed the agenda for the meeting, and the IEEE patent policy. The Minutes from the October 25, 2005, meeting in Memphis, Tennessee were approved.

4. Mission – Develop Functional Life Test and Supporting Technical Paper for De-energized Tap-changers

5. Reports from Reinhausen, Central Moloney on test results

   Dr. Kramer reported on testing conducted by Reinhausen. Reinhausen is concerned that 130 C oil may prove to be a fire hazard, and have proposed 110 C instead. They also believe that the test time at 110 C oil and 3 times rated current for 16 hours on and 8 hours off daily will need to be extended from 30 days to 150 days. An update on progress will be presented at the October meeting. Presentation to be posted on the website.

   Darren Barnett reported on testing conducted by Central Moloney. Darren indicated that he had been measuring resistance of 2 contacts in series instead of each contact alone. Hopkinson indicated that the series measurement masks the precision of resistance change and should not be done. Darren indicated that he will change to the more precise measurement

technique where the voltage probes are placed close to each contact in the future. Presentation to be posted on the website.

The meeting adjourned at 10:36 AM.

7.6.1.10 WORKING GROUP FOR REVISION OF C57.135, GUIDE FOR THE APPLICATION, SPECIFICATION AND TESTING OF PHASE-SHIFTING TRANSFORMERS – Jim McIver, Chairman

The meeting was held on Tuesday Mar. 21st at 11:00 am. After the usual introduction and display of IEEE's Patent policy, the minutes of the previous meeting were approved as written.

Joe Cheung has replaced Joe Watson as secretary.

- 7 members, 5 guests were in attendance.
- Focus of the WG remains editorial revisions & clean-up of the original figures
  - Present guide posted on TC website for revision suggestions.
  - TF members will be meeting electronically to reformat & revise Section 4 figures.
  - To date, few comments received requesting editorial revisions. McIver & Lundquist will solicit additional comments from Pwr Transformer Sub-committee.
- PAR to officially initiate the revision process will be submitted by the chair during the week of March 24.
- The revised guide will have dual Logo status with IEC. The SA staff assures that the new dual logo revision process is well established.
- The meeting was adjourned at 11:30 AM.

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

No meeting minutes received from Javier Arteaga.

7.6.1.12 IEEE STD 638-1992, IEEE STANDARD FOR QUALIFICATION OF CLASS 1E TRANSFORMERS FOR NUCLEAR POWER GENERATING STATIONS REAFFIRMATION – Craig Swinderman, Chairman

Date: Tuesday, March 21, 2006 – 3:15 pm to 4:30 pm.

Attendees: 4 members + 4 guests

This was the initial meeting of the Working Group. The existing standard IEEE 638 is now up for reaffirmation, but has received some negative comments during the balloting, including both technical and editorial aspects. As such, this new working group was formed to work on revising the existing standard. The existing document covers transformers rated 601V up to 15,000 V for the high voltage winding, and up to 2,500 kVA self-cooled rating transformers for Class 1E applications.

There were discussions on whether to take the opportunity when revising the existing standard to have the scope of the document expanded to cover a wider range of transformers, such as wind turbine transformers.

Fortunately, a few of the attendees in the meeting were from the Nuclear Power Generation industry and familiar with the existing standard. It was pointed out that “Class 1E” is a specific requirement in the Nuclear industry for a special class of electrical equipment involved with powering the systems that safely shut down a nuclear reactor in the case of an emergency. It is for this reason that there is demanding qualification requirements placed on this type of equipment. This also ties in with the requirements of IEEE 323, which describe requirements for qualification of all types of electrical equipment used for “Class 1E” applications.

It was suggested that IEEE 323 be reviewed, and that possibly a liaison from IEEE 323 working group be invited to attend our working group for IEEE 638 to make sure the revisions are in agreement with IEEE 323.

It was also recommended to consult with various people from the Nuclear Power industry to get an opinion for how a widening of the scope of IEEE 638 would be perceived and voted on by that industry.

After this investigation, we will determine if the scope of the IEEE 638 document should be expanded to cover other transformer applications or if the scope should be kept to its present limit.

An additional topic of discussion was the Annex A contained in the existing IEEE 638-1992 document. Annex A is used to demonstrate the thermal ageing of the transformer insulation materials. It was discussed that members from the Loading Guide working group or Insulation Life subcommittee should be consulted to see if Annex A is up-to-date and still applicable.

Once the scope of the IEEE 638 revision has been determined, we will issue a request for a PAR to revise the existing document.

The meeting adjourned at 4:30 pm.

7.6.1.13 TASK FORCE, TRANSFORMER TANK RUPTURE AND MITIGATION – Peter Zhao, Chairman

The chair opened the meeting at 11:00AM, and welcomed the members and guests. There were 54 attendees in total which included 8 members and 46 guests. 13 guests requested the membership to the TF.

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

This is a general review and presentation session – Transformer Rupture and Mitigation.

After Memphis meeting, the members were starting to work on the task as a team with communication through phone conferences and e-mail, and the following were accomplished;

- Scope of work, review subjects were identified and confirmed.
- Review groups/pairs were formed.
- Presentation reports (8) were prepared, which cover the areas:
  - Transformer Rupture Statistics
  - Mitigation Techniques (5 reports)
  - Present Std Coverage to the Subjects
  - One Utility’s Practice in Specifying the Tank Requirements

During the meeting, only 6 of 8 presentations were made due to the time restriction, and the balance will be presented in 2006 Fall Meeting.

During the Question period, the following were discussed:

- A survey to the Users related to the tank requirements and specifications was suggested to be performed.
- One more review subject – nitrogen blanked transformer was added.
- Additional brand of less flammable fluids will be reviewed.

The TF will help users to better understand the tank rupture and mitigation techniques available on the market, and therefore properly address their needs.

7.6.1.14 C57.116 Reaffirmation Report – Tim Raymond

7.6.2 OLD BUSINESS

None.

7.6.3 NEW BUSINESS

It was stressed that Working Group and Task Force Chairs must inform all presenters that product specific names, trade names or commercial names must not be allowed in their presentation material. Generic names should be used.

7.7 Underground Transformers and Network Protectors – (Carl G. Niemann)

Meeting Minutes – Costa Mesa, California

7.7.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met on Wednesday, March 22, 2006, in the Balboa 1/2 room of the Costa Mesa Hilton Hotel at 11:00 AM with 10 members and 4 guests present. The Vice-Chair, Dan Mulkey, presided in Carl's absence.

7.7.2 Approval of Minutes

The minutes of the October 26, 2005, in Memphis, Tennessee were approved as submitted.

7.7.3 Membership

Membership stands at 17 members.

7.7.4 Chairman's Remarks

Various topics of the Administrative Subcommittee meeting were reported to the subcommittee:

7.7.5 Working Group Reports

7.7.5.1 Underground Single Phase Transformers (C57.12.23) – Alan Traut and Bikash Basu, Co-Chairmen

1. There were 16 members, 8 guests, and 1 guests requesting membership in attendance. With the addition of these new members the total membership of the WG now stands at 26.
2. The chair requested disclosure of any patents that might impact this standard. There were no patents disclosed at this meeting.
3. The minutes of the October 2005 meeting in Memphis were approved as submitted.
4. The WG agreed to make the following changes to Draft 4 of the document.
   A. Clause 7.3 Accessories. Remove the word "manual" from the pressure relief fitting. Reorganize the paragraphs for clarity. Change "oil" level indicator to "liquid" level.
   B. Suggestion to remove the word "enclosure" from the Scope of the standard. It was voted to keep it in as removing it might imply direct burial of these products.
   C. Suggestion to add a definition of enclosure to clause 3. After reviewing the definition in C57.12.80, we agreed it is acceptable and no further definition is required.
5. The chair will make the revisions indicated and send to IEEE for editorial review. If there are substantial changes as a result of that review we will meet in Montreal in the Fall 2006 to discuss those changes. If there are no substantial changes we will not meet in Montreal.

7.7.5.2 Three-Phase Underground-Type Transformers (C57.12.24) – Giuseppe Termini, and John Sullivan Co-Chairmen

1. The meeting was called to order by the Chairman at 8:00AM on Monday, March 20, 2006 in the Balboa II Room of the Hilton Costa Mesa Hotel in Costa Mesa, California. John Sullivan unable to attend meeting. Chairman asked David Blew to take minutes

of meeting. Introductions were made. The meeting was attended by 13 members and 11 guests. One guest requested membership.

2. The Chairman opened the meeting by asking if anyone in the Working Group knew or had knowledge of any existing or pending patents that may affect the work on this standard. All responses were negative.
3. The Meeting Minutes from the previous meeting in Memphis, TN were reviewed and approved.
4. The rest of the meeting consisted of a review of Draft B of the standard.
   A. Section 2 The word "not" was underlined for clarity, now to read: "When an American Standard referred to in this document is superceded by a revision approved by the American National Standards Institute, Inc., the revision shall not apply."
   B. Section 5.5 The Chairman stated that the section will stay as is until the 3ph padmount WG finalizes their work. B. Klaponski stated he also had worked on this issue and there was a lot of controversy over impedance values (being low). WG would like to be consistent with other standards.
   C. Section 6.2 Spaces were added between the temperature and ºC in two places.
   D. Section 7.1 Wording of "mineral-oil-immersed" was questioned and discussed. Left as is (see section 5.1 and note at bottom of Figure 1).
   E. Section 7.2.2 Figure 4(c) Thickness of terminal was stated to be too thin, a thickness of 3/8 inch was suggested. Further evaluation will be required.
   F. Section 7.2.2 Figure 4(d) Terminal should be 12 holes. Thickness of terminal was stated to be too thin, a thickness of 3/8 inch was suggested. Further evaluation will be required. First two lines in table (1500kVA) will be deleted.
   G. Section 7.2.2 Figure 4 Note 5 deleted (not needed as these are vertical terminals)
   H. Section 7.5 Word "enclosure" changed to "tank". Entire section moved under 7.6. Wording of pressures will be changed to be consistent with 3ph pad standard.
   I. Section 7.6.1 Word "enclosure" was deleted from text and table heading. Lots of discussion regarding wording of submersible, non-submersible, above ground vault, etc. took place. A motion to modify the Scope and/or add a note in Section 7.6.1 to address non-submersible, above ground and vault applications was made. This motion was defeated. Two (2) participants voted YES while 16 participants voted NO. The Scope will remain as is and no notes will be added to section 7.6.1 to address "other" applications besides submersible.
   J. Section 7.6.7 Clevis wording discussed, left as is.
   K. Section 7.9 Table number changed from "5" to "6".
5. The meeting was adjourned at 9:15 AM.
6. After the Meeting comment: The word "determining" on the Purpose was changed to "establishing". The purpose now reads:
   "This standard is intended for use as a basis for establishing the performance, electrical and mechanical interchangeability, and safety of the equipment covered, and to assist in the proper selection of such equipment."

7.7.5.3 Liquid Filled Secondary Network Transformers (C57.12.40) – Brian Klaponski and Dave Blew, Co-Chairmen

1. The WG met on Monday, March 20, 2006 at 09:35 am with 9 members and 6 guests.
2. The chairman reviewed the patent legal issue and asked whether there were any patents or patents pending that would affect the WG or standard. None were identified.

3. The minutes of the October 24, 2005 meeting in Memphis, TN were approved.
4. Brian Klaponski gave a brief summary of balloting process to date.
   A. Process is nearing the end. Standard has gone through a recirculation ballot and will be reviewed by RevCom on March 29/06.
   B. Once through RevCom, the standard will be published.
   C. The procedures for a Working Group to update a standard are overly complicated and too much administrative work is required from the WG. This places a huge burden on the WG chairs. There is a lot of opportunity for improvement in the process.
   D. Resolution with SCC14 issue. With assistance from the IEEE-SA staff, Mr. Frysinger was removed from the review process of our standard and the SCC14 Chairman, Mr. Bruce Barrow reviewed our standard. Recently, Mr. Frysinger resigned from SCC14.
   E. Since the standard being published was only updated to correct editorial errors, it is not really the standard we need. WG will focus on a complete review of the standard during the next review cycle.
   F. There was a comment from I. Hussain about the recirculation ballot process. There was an ABB server problem that prevented IEEE documents from being delivered. WG did not use the MyBallot system.
5. Review of new PAR. WG developed new title, scope, and purpose. Intent is for this standard to not cover dry type transformers.

Title:

Draft Standard for Network, Three-Phase Transformers, 2500 kVA and Smaller; High Voltage 34 500 GrdY/19 920 and Below; Low Voltage 600 Volts and Below

Scope:

This standard covers certain electrical, dimensional, and mechanical characteristics and takes into consideration certain safety features of three-phase, 60-Hz, liquid-immersed, self-cooled, network transformers with a primary grounding switch. These transformers are rated 2500 kVA and smaller with high voltages of 34 500GrdY/19 920 volts and below. These transformers are generally used for step-down purposes from underground primary cables and supply a secondary network system through network protectors. These transformers are typically installed below ground level.

Purpose:

This standard is intended for use as a basis for establishing the performance, electrical and mechanical interchangeability, safety of the equipment covered, and to assist in the proper selection of such equipment.

6. The draft standard will be updated and sent to all WG members.
7. The meeting was adjourned at 10:45am with the next meeting in Montreal, Quebec Canada.

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

1. The meeting was called to order at 1:45 PM on March 20, 2006, in the Balboa 2 Room of the Hilton Costa Mesa Hotel in Costa Mesa, California.
2. There were 5 members and 1 guest in attendance – see attached list:
3. he minutes from the October 24, 2005, meeting in the Peabody Hotel in Memphis, Tennessee were approved as submitted.
4. A request was made for disclosure of any patents that may be related to the work of the WG, and there were no responses to the request for disclosure.
5. Significant Activities:

G. Draft 2.1 was approved by the Standard Board on December 7, 2005
H. Michelle Turner is the Program Manager overseeing the publishing process for this standard
I. This standard will be good through 2010.

7. Next Steps: As the working group did not have any immediate revisions in mind for this standard, this working group will not meet until some further action is required.
8. Adjournment: The meeting was adjourned at 2:02 PM.

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

1. The WG was not scheduled to meet.
2. The chair will submit the draft documents to either Carl Niemann or Dan Mulkey

7.7.6 Old Business

1. none

7.7.7 Future Meetings

The location and dates for future meetings are as follows:

- Oct 21-26, 2006 Delta Center-Ville Hotel, Montreal, Canada
- March 11-15, 2007 probably Dallas, Texas
- Fall 2007, Minneapolis, Minnesota
- Spring 2008, Miami, Phoenix, San Antonio, or Charlotte
- Fall 2008, Porta, Portugal

The Subcommittee adjourned at 10:30 AM.

7.8 Audible Sound and Vibration – (J.L. Puri)

7.8.1 Introduction/Attendance

The Audible Sound and Vibrations subcommittee met at 9:30 AM on Wednesday, March 22, 2006 with fifteen members and eight guests present (two requested membership).

7.8.2 Chairman's Remarks

Chairman's Report. – In Jeewan Puri's absence, Ramsis Girgis gave a brief summary of the information made available during the Administrative Committee meeting on Sunday.

7.8.3 Working Group Reports

WG Report – In Jeewan Puri's absence, Ramsis Girgis chaired the meeting of the WG for writing Sound Level Measurement Guide. It met at 08:00 on Wednesday, March 22, 2006. There were seven members and 15 guests.

Jeewan had reported separately that a PAR had been applied for and approved; also, he had been in contact with Jodi Haas with respect to the use of the IEC Guide as the main component of the IEEE Sound Measurement Guide.

Following the presentation by Jodi Haas at the Monday lunch Standards meeting, it is obvious that it will be necessary to look at how any modifications to the IEC guide have been carried out, as more than 90% of the IEC guide has been used.

As it was not possible to proceed further on the Guide without Jeewan's input, the WG took advantage of the meeting time to review in detail the 50/60 Hz conversion text for C57.12.00 and C57.12.90, that had been written by the Loss Tolerance WG. A few minor modifications and additions were suggested and Ramsis Girgis will forward these to the Loss Tolerance WG Chair for inclusion. It was suggested that the proposed text should be circulated to the ASV Sub-Committee for review before submission to the respective Chairs for the revision of C57.12.00 and C57.12.90.

It was noted that the tutorial on the subject of Noise in HV DC Transformers and other subjects organized by Mr. Richard Dudley held on Monday evening was very useful and well received.

Under new business Alan Darwin gave a short presentation of his thoughts about the future revision of the "Siting" Guide, C57.136. He proposed that the contents of this guide should be modified to remove any duplication with the sound level measurement guide, but at the same time retaining information necessary to sound abatement. He also proposed that additional and updated sound abatement information should be added to C57.136.

Alan will come up with a "simple" questionnaire to circulate to the original WG and the ASV SC members to elicit feedback to help decide the way forward. Users and experts will also be asked to provide input updated information according to their experiences on the noise abatement issues.

The meeting adjourned at 10:15 AM
Alan D
(Alan Darwin Chaired the SC meeting for Jeewan and provided the SC report)

7.9 Bushing Subcommittee – (Fred Elliott)

7.9.1 Introduction/Attendance

Fred Elliott - Chair opened the meeting at 9:30 AM and welcomed the members and guests. There were 70 attendees with 17 members and 53 guests present. Two guests requested membership to the Bushing Subcommittee.

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

7.9.2 Approval of Minutes of Last Meeting

The minutes of last meeting in Memphis, TN were approved as written.

7.9.3 Chairman's Remarks

A special presentation was arranged during the meeting – Interaction of bushings and transformer during seismic events by Dr. Anshel Schiff. It discussed the present status of the IEEE 693 Recommended Practice for Seismic Design and Research being done to improve future editions of the document.

The presentation document was posted on the Web.

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

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

No meeting was arranged.

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

The meeting was called to order at 3:15 with 17 members and 26 guests, 7 requested memberships. After introductions the minutes of the fall 2005 meeting were approved.

No patents were disclosed.

A PAR has been submitted and will be voted on March 30. The IEEE-SA Policy on Intellectual Property was presented. A copy of the Guide in word format has been sent to Tom for ease in revising.
There were three items remaining for discussions:

- Guidelines on Draw-lead application,
- Bushing Order information checklist,
- Bushing replacement document.

During the discussions, changes were suggested on each item. These and all former items will be placed in the revised document before the next meeting.

One additional item was presented that changes would need to be made to conform to the recent revision in C57.19.00. This will be addressed by ABB (Lonnie Elder).

The meeting was adjourned at 4:00 pm.

7.9.4.3 TF – Bulk Bushings – Bob Hartgrove, Chair

No mtg / report.

7.9.4.4 C57.19.03 Corrigendum 1 – DC Bushing Standard – Fred Elliott, Chair

The std was re-conformed, and no mtg / report.

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

John Graham reported as following;

IEC BUSHING STANDARDISATION WORK

Within IEC, standardization of bushings is covered by Technical Committee TC36: Insulators, Subcommittee SC36A: Insulated Bushings.

Sub-committee officers are:

Chairman: Lars Johansson, ABB, Sweden.
Secretary: Alberto Sironi, CESI, Italy.

The last meeting of SC36A was held at the IEC General Meeting in Rosslyn, Virginia, on December 9th 2004. The next meeting will be Berlin, Germany in October 2006. There is one active working group:

SC36A MT5: IEC 60137: Insulated bushings for alternating voltages above 1kV.
Project Leader: John Graham, Trench-UK.

A Committee Draft (CD) was distributed for comment by National Committees in October 2005 and comments close in April 2006 for discussion in Berlin.

As reported previously TC14 would prefer that all dielectric tests on to the transformer have been applied to the bushing, with a margin of 10%. Bushing manufacturers consider this procedure has no technical of economic justification and if the margin is required then bushings of a higher rating should be purchased. Although we thought we had a compromise TC14 have stated that if all their requirements are not included, they will be put into the next revision of IEC60076-3. It would be unacceptable for there to be conflict between the two standards so further discussions are needed.

Other Work

SC36A MT6: IEC 61464: Dissolved gas analysis of bushings.
This new maintenance team will be set up to review the document published in 1998. This gives information on interpretation of DGA specifically for bushings. There have been issues with TC10 on the scope and whether this work should be included in IEC60599. No work yet.

SC36A MT7: IEC 61463: Seismic qualification of bushings.
This new maintenance team will be set up to review the document published in 1997. This offers a more simplified approach to qualification than IEEE 693, allowing static calculation. No work yet.

CENELEC TC36A WG4 prTS50458: Capacitance graded outdoor bushings 52 up to 420kV for oil filled transformers
This document gives dimensional standardization for transformer bushings and was accepted for publication in November 2005.

7.9.5 Old Business

- C57.19.01– Bushing Performance Characteristics and Dimensional STD was reconfirmed.

7.9.6 New Business

No new business was discussed.

7.9.7 Technical Papers

No activity was reported for this mtg.

7.9.8 Adjournment

The meeting adjourned at 10:45 AM.

7.10 Dry Type Transformers SC - (C. W. Johnson, Jr.)

7.10.1 Introductions and Approval of Minutes

The Dry Type Transformer Subcommittee met in Costa Mesa, CA on Wednesday March 22, 2006 with 14 members and 10 guests present. Introductions were made and the attendance roster was circulated. Minutes from the October 26, 2005 Memphis, TN meeting were reviewed and approved.

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

7.10.2 Working Group/Task Force Reports

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

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

1 The working group met at 3:15 pm with 10 members and 7 guests present. Those present introduced themselves.

2 There were no comments regarding the minutes from the October 24, 2005 meeting in Memphis, TN. The minutes were approved as written.

3 The Chairman asked if anyone present had any information regarding patent issues, which may affect the work of the group. No replies were received.

4 Old Business

The Chairman informed the Working Group that the PAR for amendment of the standard was approved in June 2005. The title of the standard will be extended to “IEEE Standard Test Code for Dry-Type Distribution and Power Transformers – Amendment 1.

Four sections of the standard are included in the PAR:

Section 5	Resistance measurements
Section 10	Dielectric tests
Section 11	Temperature test
Section 13	Audible sound level measurements

The majority of the meeting was spent reviewing comments from Arthur Molden and Marcel Fortin, concerning Section 10 of the standard, Dielectric Tests. The working group accepted most of the comments as proposed or with minor modifications. The results of the discussion of these comments on Section 10, with changes or additions indicated in RED, will be circulated to all members of the Working Group.
There being no new business, the meeting was adjourned at 4:40 pm.

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

The working group met in Costa Mesa at the Hilton Hotel at 1:45 PM on Monday, March 20, 2006 with 10 members and 8 guests present. Attendees introduced themselves and signed a roster.

The Vice-Chair reviewed the minutes from the last meeting, which were approved as read. The chair reviewed the patent documents for our meeting, and no patent related issues were noted for the work of this working group.

We had a fairly informal discussion related to the status of the work of this working group. There was some discussion regarding the acceptability of models vs. full size units. The advantage of the models are the quantity which can be built and tested which helps "statistics", however, some issues which come up when producing full-size coils (even smaller, say 500 kVA coils) are masked. The variety of construction methods used to produce coils make inclusion of specific models in this standard difficult. We may want to include models as an option only. An alternative would be to have better examples in an informative annex.

There is still a consensus within the working group that we should continue with this work to combine the documents, as the general process to thermally evaluate these transformers is essentially the same, with the exception that the cast coil is primarily a high voltage coil test only, whereas for the OVDT equipment, the HV coils are wound over the LV, so they are tested together.

It was agreed that the working group should review again each of the two documents to better understand the similarities and differences of the two documents and report back to the chair at the next meeting. The vice-chair will work with Sue McNally to get a website added to the main site so that the documents can be placed for working group members to access. Finally, anyone with information regarding an IEC method which looks at weight loss, as was mentioned in the last meeting, should bring this information to the next meeting. This may be a component test (for resins/varnishes/plastics?). No one is aware of this as a system test (TC112), nor a transformer test (TC14).

Meeting adjourned at 2:30 PM.

7.10.2.2 Dry Type Reactor TF - (Richard Dudley)

The Dry-Type Reactors T.F. met in the Balboa I Meeting Room of the Hilton Costa Mesa Hotel in Costa Mesa, California on Mar. 20, 2006 at 8:00 a.m. There were 9 members and 5 guests present. Lewis Powell requested membership. The following are the highlights.

1. The minutes of the Dry-Type Reactors T.F. meeting in Memphis were approved.

   NOTE: The minutes of the Costa Mesa meeting of the T.F. will not be approved until the meeting in Montreal, Quebec.

2. IEEE patent policy was reviewed and no patent issues were identified.

3. The remainder of the meeting was devoted to the revision of IEEE C57.16. The following are the key points.

   (i) The current version of IEEE C57.16 will reach its "end of life" in Oct. 2006. The Chairman, RFD, will apply for a PAR prior to that date.

   (ii) RFD has received input from various members of the IEEE Switchgear Committee on Draft #5 of ANNEX E; CB TRV issues associated with the application of CLRs. RFD informed T.F. members that Jeff Nelson, Chairman of the IEEE Switchgear Committee, believes there are jurisdictional issues associated with ANNEX E. RFD will produce Draft #6 of ANNEX E and will attempt to mitigate the jurisdictional issues; ANNEX E is informative ONLY, introduction will stress that the purpose of the annex is to alert standard users to the possible CB TRV issues associated with the application of CLRs and will direct the standard users to appropriate IEEE Switchgear standards and

guides that are appropriate, examples are included to provide insight, proposed mitigation of using capacitors is largely descriptive etc. T.F. members supported this approach; especially utility engineers that are members of the T.F. (Less Recksiedler, Paulette Payne, Peter Zhao. They felt the included examples are very helpful and that ANNEX E could help less experienced utility engineers and also help co-ordinate reactor application projects within a utility. References in ANNEX E will be updated and expanded; including a reference to an IEEE published tutorial on switching. RFD will resubmit D6 to the SWC and will continue a dialogue with Jeff Nelson and other contacts in the SWC.

(iii) Table 5 should include reduced BILs for various system voltage classes.

(iv) Audible sound testing of FRs will be included in the annex covering FRs; requested by Les Recksiedler and accepted by the T.F. Les pointed out that mitigation of noise problems in the field is very costly. Sound measurement methodology will be provided in sufficient detail and will also be co-ordinated with information in the IEEE sound measurement guide now under preparation. Measurement of sound produced by FRs under harmonic loading is possible with equipment available today; measurement of sound at individual harmonic frequencies and calculation of total sound power under combined harmonic loading.

(v) It was suggested that the IEEE siting guide during its next revision should be updated to include SVC equipment; transformers and reactors.

(vi) Comments received during the last reaffirmation of IEEE C57.16 will be included in the revision; Draft #1.

(vii) Reactors are sometimes supplied in steel or FG enclosures for personal protection. Reactors are also supplied in special enclosures for sound mitigation. A separate section or a normative annex will be added to provide some background information plus specific test code requirements; temperature rise test (including the enclosure), impulse testing (including the enclosure) etc. The magnetic clearance information in the informative annex will be upgraded to include information on reactors (especially CLRs) installed in utility designed/supplied cells.

(viii) Fault current limiters are being developed. A discussion took place as to where they should be covered in IEEE standards. No conclusion was reached except the observation that fault current limiters are not sufficiently developed to warrant inclusion in a standard.

(ix) An informative annex will be developed on de-Q'ing of FRs; with a focus on impact on test code which will be highly dependent on the de-Q'ing methodology. Les Recksiedler will produce a draft.

The meeting adjourned at 9:15 a.m. The chairman stated that he would prepare draft material except as specifically noted in the minutes. Note that input was requested re the revision of IEEE 1277 re dry type SMRs but T.F. members had no suggestions.

7.10.3 Old Business

7.10.3.1

The chair announced that John Sullivan had informed him that draft 6 of IEEE C57.12.01, “Standard General Requirements for Dry Type Distribution and Power Transformers Including Those with Solid-Cast and/or Resin Encapsulated Windings”, had been approved at REVCON. The document was now under editorial review and that the standard would be published this spring.

7.10.3.2

Paulette Powell informed the subcommittee that the reaffirmation ballot for IEEE C57.134, “IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers”, was successfully completed and that the document has been submitted to REVCOM for approval.

7.10.3.3

Tim Lewis informed the subcommittee that the reaffirmation ballot forIEEE C57.94, “IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry Type General Purpose Distribution and Power Transformers” was still open as there were unresolved negative ballots. The Chair suggested that Tim contact Jodi Haas for support in addressing the negative ballots allowing us to expedite reaffirmation.

7.10.4 New Business

1 The Chairman reviewed the status of all Dry Type Transformer standards.

1 Marcel Fortin questioned the status of the 3 task forces formed to address the negative ballots on draft 6 of IEEE C57.12.01. Marcel reminded the subcommittee that his reversal of his negative ballot was predicated on resolving the negative comments through the task forces. The chair will contact John Sullivan for an update on the status of the task forces.

2 The chair reminded the subcommittee that IEEE C57.12.91, “IEEE Standard Test Code for Dry-Type Distribution and Power Transformers”, requires reaffirmation this year. Although there is an open PAR for amendment of the document with an expiration of 2009, the document still needs to be balloted this year.

3 A suggestion was made that we review IEEE C57.124 “Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers” and possibly combine or coordinate with IEEE C57.113 “IEEE Guide for Partial Discharge Measurement in Liquid-Filled Transformers and Shunt Reactors”.

4 Arthur Molden expressed interest in reviewing IEEE C57.12.58 “IEEE Guide for Conducting a Transient Analysis of a Dry-Type Transformer Coil”. He will need a copy of the standard and the chair agreed to supply one

5 Bill Simpson noted that the personal information listed for working group chairs was out of date in the Standards Status Report. I will inform Bill Chiu that the information needs to be updated.

2 The chair stated that Bill Chiu had informed him that the four (4) NEMA documents, (C57.12.50, C57.12.51, C57.12.52, and C57.12.55) whose copyright was transferred from NEMA to the IEEE Transformers Committee, will require as new documents for the process of becoming IEEE documents. The following people agreed to lead the documents through the approval process

C57.12.50 – Carl Bush
C57.12.51 – Paulette Powell
C57.12.52 – Sheldon Kennedy
C57.12.55 – Charles Johnson

As there were no electronic copies of these documents, Roger Wicks "volunteered" his wife to type the documents into MS Word as a 1st step.

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

7.11 Distribution Transformer Subcommittee Report - (Ken Hanus)

Ken S. Hanus - Chairman
ken.hanus@ieee.org

The Distribution Transformer Subcommittee has a total of 8 active working groups, 6 of those met in Costa Mesa.

Subcommittee Meeting Wednesday March 22, 2006 at 9:30 am
26 Members
15 Guests
41 TOTAL
2 Requests for membership

7.11.1 Chair's Remarks & Announcements:

Review of Administrative Committee meeting highlights
? Future Meetings
? Main Committee membership
? Transformer Standards Activity
? A request for patent disclosure concerns was made with none being indicated.
? The Unapproved Memphis minutes were approved with no corrections.

7.11.2 Working Group Reports

7.11.2.1 C57.12.20 Overhead Distribution Transformers

Alan Wilks & Tommy Cooper Co Chairs
awilks@ermco-eci.com & Tommy.cooper@faypwc.com
PAR Status: N/A
PAR Expiration Date: No current active PAR, to be applied for after April 3, 2006
Current Standard Date: 2005
Current Draft Being Worked On: D1
Meeting Time: 09:30am, Monday, March 20, 2006
Attendance: 46 Total
20 Members
24 Guests
2 Request for membership

Alan Wilks called the WG C57.12.20 meeting to order at 9:30, introductions were made and rosters were circulated. The minutes of the fall 05 meeting in Memphis were reviewed and approved. Alan then reminded everyone of the IEEE policy on patents and asked if anyone had any patents to declare, none were declared.

Old Business: Alan then recommended that 2 members be removed from the roster and 1 member we need to wait until we heard from him, his recommendation passed.

New Business: Alan then went over the proposed wording of Dielectric tests from The WG on LF Tests. The wording was "For single-phase transformers with a BIL of 150 KV or less that have only one high-voltage bushing, the high-voltage neutral terminal permanently connected to ground, and no secondary windings permanently grounded, no applied voltage test is required. These transformers shall receive an induced-voltage test between the HV terminal and ground with duration of 7200 cycles but not less than 15 seconds. This voltage shall be 1000 volts plus 3.46 times the rated

transformer winding voltage, but in no case shall the line-to-ground voltage developed exceed 40,000 volts for 125 KV BIL or 50,000 volts for 150 KV BIL. An applied potential test shall be applied to all windings that are not permanently grounded." Alan will go back to the WG for clarification of the test frequency.

Tommy then went over the proposed new PAR and everyone agreed to him applying for the PAR.

Alan then started on a list that he had compiled on all of the comments that were not covered in the last revision of C57.12.20. The first three things were considered to be irrelevant, the next four pertained to the definitions of a "fault" and a "test" in section 3 as used in section 9. After much discussion and everyone agreeing that the wording needed to be changed, Alan assigned the case to a task force of Marcel Fortin, Tim Olson and Barrientos Israel to come up with a recommendation on the wording by the Fall 06 meeting in Montreal.

The next comment about the definition of an internal fusible element should be left as is. Saumen Kundu's comment about section 6.2 should be part of C57.12.00 and .90. Comment by Bill Hopf about the 25°C oil level to be left alone. Comment by Chuck Simmons on 7.1.3 about voltage to be left as is in C57.12.00. The comment by Mike Pehosh about fully insulated neutral bushing to be left as worded in C57.12.34. Comment by Don Platts about tie down lugs not within scope of C57.12.20. Comment by Chuck Simmons definition of a standard hookstick to be solved by either Tommy or Alan surveying PRD manufacturers on their particular pull ring sizes. The first comment by Ignacio Ares on section 7.2.5.1 resulted in Ignacio to look up the wording comparison to C57.91. On the second comment by Ignacio on adding another Dual Voltage was defeated because he was the only one using that voltage.

The meeting was adjourned at 10:40 am.

7.11.2.2 C57.12.38 Single-Phase Padmounted Distribution Transformers Combined C57.12.25 & C57.12.21

Ali Ghafourian & Ignacio Ares Co Chairs
aghafourian@ermco-eci.com & Ignacio_ares@fpl.com
PAR Status: Approved 12/08/1998 (For combining Standards C57.12.25 & C57.12.21) PAR changes were submitted and will be approved next week. The PAR change centered on the dropping of the delta loop transformers and to cover only 240/120 secondary volts.
PAR expiration Date: 12-31-2009
Current Standard Date: 1995
Current Draft Being Worked on: D6, Dated: March 2006
Meeting Time: 11:00am, Monday, March 20, 2006
Attendance: 41 Total
48 Members
5 Guests
6 Request for membership

Introductions were made and roster was circulated.

The IEEE Patent Disclosure information was discussed and there were no patents noted that pertain to these standards.

The unofficial minutes of the last meeting held in Memphis, TN in October of 2005 were approved with no corrections.

The WG then discussed the new draft D6 which incorporated the changes made to the previous draft D5.3 as follows:

- Changes in scope: Low Voltage changed from 480 volts and below to 240/120 volts.
- Figures 5 and 6 were for delta connected transformers were deleted.

The group then discussed other proposed changes and corrections to the current draft D6 as follows:

- On table 2, add missing footnote reference b (the require connector rating should be specified) for 16340 GrdY/9430 high voltage rating.
- There was a also a comment made that the information in table form under 4.1 should have a table number. A similar comment was also made as to adding a title to figures 1-4 at the top because the titles do not necessarily match. A suggestion was made to add titles similar to those found in the scope. Another suggestion was to add the words live front or dead front to the figure titles as pertinent. After some discussion the WG decided to include the figure titles as found in the scope.
- A comment was made that the scope should be first with the purpose second and that the comment about PCB's should be part of the purpose and not the scope.
- A comment was made to drop the second sentence of 4.1, but after some discussion, the WG agreed to leave it as is in the standard.
- A concern was raised about the dimension to the edge of the tank. The present standard does not show any dimension from HIA to the top of the sill. Draft 6 incorporates a 3" minimum dimension.
- Also, a concern was also raised on type one transformer, dimension from X1 to the outside of the tank that the dimension of 3" shown is not adequate. After some discussion, the working group decided to keep the 3" dimension and let the user specify a larger dimension if needed.

7.11.2.3 C57.12.28, C57.12.29, C57.12.31 & C57.12.32 Cabinet integrity Standards

Bob Olen & Dan Mulkey Co Chairs
bolen@cooperpower.com & dhm3@pge.com
Meeting Time: March 21, 2006 Time: 8:00 AM
Attendance: 39 Total
22 Members
17 Guests

The minutes from the October 25, 2005, in Memphis, Tennessee were approved as submitted.

A request was made for disclosure of any patents that may be related to the work of the WG, and there were no responses to the request for disclosure.

The PAR process was started by Bob Olen as per agreement at the last meeting. The submittal was halted due to concerns that rather than issue a new standard that must be maintained, it would be better if the coastal version was combined into one standard with the "normal" version. After discussion with the chairs, the standards coordinator, and the subcommittee chair, it was decided that it was OK to proceed as the working group had proposed. The working group then proceeded to discuss the scope, purpose, and general outline of C57.12.31 and the proposed coastal pole-bolt version

The term "enclosure" had been brought up in several other working groups and its use in these standards was discussed. It was the general consensus to leave "enclosure" but to add a definition as it pertained to these standards. Brian Klaponski suggested the following:
Enclosure – refers to all external carbon steel parts that are exposed to the weather (for the "normal" standard)
Enclosure – refers to all external substrate parts that are exposed to the weather (for the "coastal" standard)

C57.12.28 Pad-Mounted Equipment Enclosure Integrity
PAR Status: No current PAR
PAR expiration Date: N/A
Current Standard Date: September 30, 2005
Current Draft Being Worked on: N/A

C57.12.29 Pad-Mounted Equipment Enclosure Integrity for Coastal Environments
PAR Status: No current PAR
PAR expiration Date: N/A
Current Standard Date: November 10, 2005
Current Draft Being Worked on: N/A

C57.12.31 Pole Mounted Equipment Enclosure Integrity
PAR Status: No Current PAR
PAR expiration Date: N/A
Current Standard Date: 2002 Published March 7, 2003
Current Draft Being Worked on: N/A

Reviewed first rough draft.
Discussed title, scope, and purpose
Discussed the included equipment:
"switchgear" versus "switches" – members should discuss with other parties, Added capacitors
Added sectionalizers

The Salt Spray Test is to be removed following the .28 standard
Items that still need to be done:

Need English units moved back into text – Chairs will do first run

Need to check order of Scope & Purpose [Complete – OK as is]

PAR – will be submitted following the next working group meeting.

C57.12.32 Submersible Equipment Enclosure Integrity
PAR Status: Approved by NESCOM N/A
PAR expiration Date: N/A
Current Standard Date: 2002 Published March 7, 2003
Current Draft Being Worked on: N/A

Status: On hold for now. It can either be reaffirmed or a PAR taken out by 2007

Work to be done:
English units moved back into text
Scope – change "(with exception of network protectors)" to "and network protectors"
Need to check order of Scope & Purpose [Complete – OK as is]

C57.12.XX Standard for Pole-Mounted Equipment – Enclosure Integrity for Coastal Environments
PAR Status: NONE
PAR expiration Date: N/A
Current Standard Date: NONE

Current Draft Being Worked on: NONE Dated : NONE

Discussed Title, Scope, and Purpose

Reviewed first rough draft.

Made the same changes as in C57.12.31 ("Normal" Pole-Mount)

PAR – will be submitted after the next working group meeting
Quickly reviewed document with the coastal testing of C57.12.29 merged into C57.12.31

Items that still need to be done:
Work on stainless steel galling considerations

The meeting was adjourned by 9:15 AM.

7.11.2.4 C57.12.34 Three-Phase Padmounted Distribution Transformers
Ron Stahara & Steve Shull Co Chairs
rjstahara@msn.com & sshull@empiredistrict.com
PAR Status: New PAR required for next revision
PAR expiration Date: N/A
Current Standard Date: Published March 8, 2005 (2004 date on document)
Current Draft Being Worked On: N/A See Below
Meeting Time: March 20, 2006 Time: 1:45 PM
Attendance: 45 Total
19 Members
14 Guests
12 Guests Requesting Memberships

Ron Stahara called the meeting to order, introductions were made, and an attendance roster was circulated. Ron reviewed the IEEE Patent Policy and asked the group if there were any patents that needed to be disclosed. None were announced to the group. The minutes were reviewed and approved as written.

The remaining time in the meeting was spent discussing the report provided by Brian Klaponski on proposed impedance ranges for 75 through 500 kVA transformers. The report as shown below calculates minimum impedances based on short circuit requirements of C57.12.00-2000, applying tolerances and then back calculating into an absolute minimum impedance.

C57.12.34 Impedance Report

This report is being written on the basis of the short circuit requirement defined in the current IEEE test requirement C57.12.00-2000. This report does not take into account secondary fault considerations of low voltage equipment such as typical panelboards because that is to be subject of a separate discussion.

Table 14 of C57.12.00-2000 (page 38) defines the maximum required per unit short circuit withstand capability of 3 phase transformers 15 kVA to 500 kVA as follows. I have added to this table an implied impedance:

		Implied Impedance
15 to 75 kVA	40 times	2.5%
112.5 to 300 kVA	35 times	2.857%
500 kVA	25 times	4.0%

Above 500 kVA the standard says that the per unit withstand is limited by the transformer impedance; therefore, there is not an issue.

Currently C57.12.34-2004 allows an impedance range in clause 7.1 as follows:

kVA	Impedance Voltage
75	1.10% – 5.75%
112.5 – 300	1.40% - 5.75%
500	1.70% - 5.75%

This means that transformers manufactured with impedances less than the implied impedances shown in the first table above are not required to withstand a short circuit that they may experience in the field. My recommendation is to raise the lower limits of the impedances to agree with the first table above while also taking into account impedance tolerances in clause 9.2 of C57.12.00-2000.

This would suggest a table as follows:

kVA	Impedance Voltage
75	2.70% - 5.75%
112.5 – 300	3.10% - 5.75%
500	4.35% - 5.75%

End of Report

The ensuing discussion brought about several points as to the correct answer, including –

- Impedance values should be based on sound engineering technical calculations which can be documented as to where the numbers come from
- Raising the minimum impedances to what was shown in the report may lead to voltage regulation issues
- Most users will specify there own impedance minimums based on there own system parameters
- The minimum impedances in the document should provide clear requirements for users with minimal technical support
- If the committee is not able to produce values based on sound engineering calculations then maybe no values should be listed
- Committee members agree there is a need for these values but no one can give specific instances of where the lack of impedances has led to problems

Guiseppe Termine made a motion to accept the impedance ranges in the report and it passed 16-7. It was also discussed to include a statement along with the motion to state the basis of the impedance values and that users may need to evaluate other requirements such as voltage regulation, system impedance or available fault current to the end user.

The meeting adjourned at 3:00 pm.

7.11.2.5 C57.12.35 Bar Coding For Distribution Transformers

Lee Matthews & Giuseppe Termine Co Chairs
lmatthews@howard-ind.com & Giuesseppe.termine@peco-energy.com
PAR Status: APPROVED Dated: March 4, 2005
PAR expiration Date: December 31, 2009
Current Standard Date: 1996 (R2004)
Current Draft Being Worked On: Draft #2, Dated: October 6, 2005
Meeting Time: March 21, 3:15 PM
Attendance: 26 Total
15 Members
11 Guests
2 Guest Requesting Memberships

The meeting was called to order on March 21, 2006 at 3:15 p.m. in the Emerald 2/3 Room of the Costa Mesa Hilton Hotel in Costa Mesa, CA.

The meeting began with introductions of those in attendance.

The chairman asked if anyone was aware of any patents that might affect the development of this standard. No patent claims were made.

The minutes of the previous meeting were approved.

The revisions in Draft 3, from comments at the previous meeting, were reviewed. No additional comments were received.

The proposed Abstract and Keywords were reviewed. They were approved as presented.

The chairman asked that any additional comments, for consideration in the next Draft be provided by July 31, 2006.

The meeting was adjourned at 3:35 P.M.

7.11.2.6 C57.12.36 Distribution Substation Transformers

John Rossetti & David Aho - Co Chairs
jrossetti@mlgw.org & daho@cooperpower.com
PAR Status: PAR Approved June 2002
PAR expiration Date: December 2006
Current Standard Date: NEW Standard Under Development
Current Draft Being Worked On: D10
Meeting Date: March 21, 2006 Time: 11:00AM
Attendance: 42 Total
17 Members
25 Guests
3 Guest Requesting Membership

The unapproved minutes from the F05 Memphis meeting were approved. The patent policy was discussed and no issues were identified.

Balloting closed 3/17/06, with 77% of ballots returned and 86% were affirmative. There were 11 negative ballots and a total of 90 comments.

The original PAR scope is not in agreement with the balloted document. A PAR revision will be submitted after April 3rd to get the wording of the scope to agree with the document. The overall scope of the products or ratings covered will not change. This should resolve a variety of comments received regarding the scope.

The majority of the comments are editorial in nature. Of the 90 comments, 38 have been reviewed so far.

The remainder of the meeting focused on addressing a handful of specific comments that required input from the working group. A consensus was reached on how best to deal with the issues raised. A ballot resolution task force will be created to address each comment. Each balloter should have access to all comments via "My Ballot", these will also be posted on the Transformer committee website. Everyone was asked to review the comments and provide input where possible.

Specific Ballot Comments Reviewed:
1.1 Scope: 50 Hz is currently not included but will be added to match original intent.

2.0 There was a comment about the IEEE DOT not being a standard and it shouldn't be listed as a normative reference. Not sure where this comment comes from as we didn't find the reference.

3.0 Need to check with IEEE editorial review concerning the need to reference the specific year. By using a specific year you can lock in references to specific tables.

Table 4.2 appears to have some possible typos and we have to review the history that may provide an explanation of how we got to these voltages.

Table 4.3 had several technical comments about the voltages. Need to go back through the past revisions and look at making the voltages consistent.

4.7 Comment suggest the desire to test as Class I transformers, but this is just the opposite of what we are doing with this standard and it will not be included.

5.1.7 Pressure Relief does not recommend positioning of the relief vent for personnel safety. Suggestion was to add a statement to cover this. The WG did not think this belongs and that the comment refers to a control cabinet that may not even exist. It is not in other standards and was decided to leave out of this one.

5.2 Comment about bushings not being IEEE standards and while true it is not a limitation as manufacturers are making everything required.

5.3 In enclosures we talk about "a degree of protection" and the comment suggested a reference to a NEMA enclosure rating. There is not an applicable rating for transformer enclosures.

5.7 Under grounding provisions there was a comment requesting 2, 4, or 6-hole pads based on minimum through fault current. The suggestion was to add details with respect to how this is done with specific withstand time. It was thought this was not applicable.

5.13.2 Secondary lead termination and arrangement suggestion was made to cover specific equipment enclosures, minimum volume requirements, lighting, condensation control, terminal strip requirements, etc. The WG did not agree this belongs in a standard and should not be included.

5.15 Insulating liquid limitations exist and are not intended to be part of this document.

5.16 Suggestion was to include a statement that if the user wants to test to C57.91 then they must request to use the loading guide with these transformers. It was thought that a statement could be added to simply clarify this statement.

7.11.2.7 C57.15 Step-Voltage Regulators

Craig Colopy & Gael Kennedy Co Chairs
ccolopy@cooperpower.com & grkennedy@nppd.com
PAR Status: APPROVED Date: June 9, 2005
PAR Expiration Date: December 31, 2009
Current Standard Date: C57.15 – 1999 – Published April 2000
Current Draft Being Worked On: Draft 5.1 Dated: October 2005
Meeting Date: WG did not meet in Costa Mesa

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

Richard Hollingsworth & Thomas Callsen Co Chairs
rhollin@howard-ind.com & Thomas.Callsen@ExelonCorp.com
PAR Status: Submitted for editorial review and balloting
PAR Expiration Date: December 2005
Current Standard Date: Published under IEEE Std. 1388-2000
Current Draft Being Worked On: 11d Dated: October 2005
Meeting Date: March 20, 2006 Time: 8:00am
Attendance: 20 Total
9 Members
11 Guests
3 Guest Requesting Membership

After the welcoming statements, introductions were made. The rosters were passed around.

The patent policy was reviewed and no one responded that they had any patents that would affect this document.

The PAR status was reviewed. The PAR will be voted on at the March meeting. So far, there have only been two comments. Both comments were for approval.

In anticipation of the existing PAR being approved, the working group started to formulate the “Scope” of the next PAR request. The “Scope” will include the Step-Voltage Regulator and Dry type.

It was mentioned that the Step-Voltage Regulators have two different types and will require not only the defined product type, but also the ANSI type.

Dry type transformers also come in two types, LVGP and MVGP.

It was decided that the Step-Voltage Regulator and Dry Type will be defined through, and separated from the existing document, separate paragraphs.

A comment was made that the fluid on a Dry Type transformer should be air instead of none. Air is a fluid. Other comments felt like this definition would confuse people more than clarify the cooling medium.

Angela Ortiz commented that there are options for correcting and adding to an existing PAR. There is an option for an "amended" standard. It was reported that it will be a second document that will carry a suffix of "a".

The committee is requesting on one time slot at the next meeting.

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

7.11.3 Subcommittee Old Business:
None reported

7.11.4 Subcommittee New Business:
None reported

7.12 Delectric Test Subcommittee – (Loren B. Wagenaar)

The Dielectric Test Subcommittee (DTSC) met on Wednesday, March 22, 2006, in Costa Mesa, CA with 35 members and 30 guests present. 4 of the guests requested membership and are welcomed into the Subcommittee. See the last page of these minutes for attendance list.

7.12.1 Chairman's Remarks

1) The Chair reviewed highlights of the Administrative Subcommittee meeting held on Sunday:

   a) The next meeting is October 22-26, 2006 in Montreal, QC, Canada. Host will be Thang Hochanh of Hydro Quebec IREQ. The venue is the Delta Centerville Hotel; the room rate is $189 CAD (approximately $165 USD).

   b) The Par submittal process is now done online. WG and TF Chairs received a luncheon tutorial from IEEE staff. Further inquiries should be directed to Bill Chiu.

   c) The Chair asked for comments or input regarding scheduling of meetings at this Costa Mesa event, since there are several conflicts between the major Subcommittee Meetings (for example; Dielectric Test and Insulation Life are held at same time)

   d) The Chair announced his retirement from AEP effective on June 30, 2006. However, he will continue as Chair of this Subcommittee for the immediate future.

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2) The minutes of the Fall 2005 meeting in Memphis, TN were approved as written, and are available on the IEEE Transformers Committee Web Site.

7.12.2 Working Group Reports

7.12.2.1 Working Group on Acoustic Partial Discharge Tests in Transformers - J.W. Harley, Chair; Alan Darwin, Secretary

Attendance: 10 members and 32 guests. Attendees introduced themselves.

The minutes from the 24 October 2005 Memphis, TN meeting were approved.

IEEE Patent disclosure requirements were discussed and a request was made for attendees to identify or disclose any patents that may be related to the work of the WG. There were no responses.

The discussion topics focused on PC57.127 Draft Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors.

1. The invitation to participate in the ballot for the Guide was opened on 2 February 2006 and closed 4 March 2006. There were 81 respondents from the pool of 438. The classifications and percents of the eligible voters were: General Interest 40.7%, Producer 17.3% and User 42.0%. The balloting group is balanced since there is representation from all interested parties, but not domination by any one of those parties. The ballot invitation period will be extended briefly to allow two people who registered within the initial invitation period, but registered incorrectly, to register properly.

2. A number of definitions were questioned during the Mandatory Editorial Coordination process. At the WG meeting, elaborative text was moved from the definitions to the body of the Guide resulting in the creation of two new clauses, “Acoustic signal” and “Velocity of sound in oil,” and addition to the text of other clauses. Several definitions were deleted when it was determined they were standard terms in the IEEE Dictionary.

3. Clause 3 “Detection and measurement of partial discharge – background information” was reviewed by the group. This clause had been submitted since the last meeting and edited by a sub-group of WG members.

4. A new case study has been added to Annex D, which is an informative tutorial. This covers the diagnosis of a 500 kV 243MVA core form single phase autotransformer that subsequently failed. The case highlights coordination with DGA trends and the often sporadic occurrence of PD, which in this instance was dependent on loading and relatively small voltage changes.

The consensus of the Working Group is that the PC57.127 Guide is ready to go to Ballot. This will be done in the near future.

7.12.2.2 Working Group on Revision of Low Frequency Tests – Bertrand Poulin, Chair

The meeting was held on Monday March 20th at 11h00 am. After the usual introduction and display of IEEE’s Patent policy, the minutes of the previous meeting were approved as written.

Next, Dr. Lemke presented his report on the task force meeting for the revision of C57.113 (IEEE Guide for Electrical Measurements of Partial Discharges in Transformers). The minutes of this meeting are found in Appendix 1. The main topics are:

I. The process of revision of the guide is going well. Comments and suggestions after draft 3 were incorporated in draft 4 and circulated. New comments were received and will be addressed in draft 5 before the next meeting.
II. The main topic of discussion during the meeting was around the evaluation of the maximum repetitive apparent charge and the train pulse response of detectors, which leads to smoothing of the detector’s response for easier and proper evaluation of results. (see minutes for details)
III. As the document has reached a point where it will soon be ready for balloting, it is time to initiate a PAR so that a balloting group be formed and the balloting process can take place in the near future. The PAR will be requested for C57.113 to become a “recommended practice” rather than a guide, as its content fits better with IEEE’s definition of a recommended practice rather than a guide.

The rest of the meeting was devoted to the review and discussion of comments and suggestions received since the last meeting of the working group.

- For the induced test, it is suggested to measure the pd level before the enhancement and after the enhancement. It is proposed that a maximum increase of 150 pC between these two measurements be added as a new criteria. If not met, a new enhancement must be made. This proposal raised discussions and objections although most people present agreed with the principle.

- 10.8.2 Induced test on class 2 power transformers – test procedure. For the case of transformers equipped with pumps, make it mandatory to run the pumps during the induced test. The chairman proposed to suggest this test in the standard as a type test only. This

suggestion will be added in the next revision of the standard (not the next recirculation for 2006). It was also proposed that this suggestion was limited to transformers with oil forced in the windings by pumps (ODAF cooling only).

- Since last meeting, many members have suggested that the maximum apparent charge level be reduced from 500 pC to 300 pC for the 1.5 pu one hour test. This topic has been discussed in the past and no consensus has ever been reached. Members pointed out that there is no evidence that adopting this criteria would lead to better transformers nor better detection of eventual defects. Transformer designers do not design for 300 pC or 500 pC. It is measured at test. It was suggested that some words be added in case the criteria is not met, that the transformer need not to be rejected, but the cause of the pd be investigated and decision be made base on the result of the investigation by the manufacturer and his customer.

These three issues will be addressed in the next revision of C57.12.90 with new proposals and we will see what comments are received.

APPENDIX 1

Unapproved Minutes of the Meeting
Task Force Electrical Partial Discharge Measurement
Hilton Hotel, Costa Mesa, CA March 20, 2006

1. Introduction

The Chairman opened the meeting at 8:00 a.m. and welcomed the members and guests. There were 72 attendees present, 28 of them TF members and 44 guests.

2. IEEE Patent Policy

The IEEE Patent Policy was discussed based on the submitted transparencies. There were no any patent issues for this TF Meeting.

3. Approval of Agenda

The submitted tentative agenda was approved as it was.

4. Approval of Minutes of the previous Meeting

The minutes of the previous TF meeting in Memphis, TN, were approved as written.

5. Activities for revision the IEEE Guide C57.113

The comments and suggestions after the third draft were incorporated in the draft 4, which was circulated prior this meeting and reviewed today. The discussion was focussed mainly on the following topics:

- Evaluation of PD test results, see chapter 6.0. It was agreed that no quantitative values will be presented because this is the issue of IEEE guide C57.12.90.
- Fundamentals for PD pulse processing, such as the quasi-integration used for measuring the apparent charge, q, as well as the pulse train response in order to evaluate the largest repeatedly apparent charge magnitude, q_m, see Appendix 7.2.
- Practical examples for both, noise signatures and PD pattern recognition.

6. Future work

The future work will deal with the incorporation of the comments and suggestions of this meeting in the final document. In particular, besides additional practical examples for noise signatures and PD pattern recognition the References presented in chapter 2.0 as well as the Bibliography listed in appendix F will be reviewed and updated if necessary.

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

The WG met on March 21, 2006, from 3:15 pm to 4:30 pm. Fourteen members and thirty-three guests attended the meeting two guest requested membership. Peter Heinzig chaired the meeting in the absence of Pierre Riffon. The agenda was accepted as written. The minutes of the Memphis meeting were approved as written.

The IEEE patent disclosure requirement policy was discussed. Reference to the package posted on the IEEE Transformers Committee web site was made. None of the members and guests present during the meeting was aware of any patents related to the work of the WG.

The first technical subject on the agenda was the review of the revised proposal made on impulse test procedure for transformers having non-linear devices. The WG was informed that the proposal agreed during the Memphis meeting was sent on March 9, 2006 to Subhash Tuli for inclusion in the next IEEE C57.12.90 draft for ballot. The proposal will be sent again, this time to Stephen Antosz, because the responsibility for C57.12.90 was handed over to him in the meantime.

The second technical subject on the agenda was the review of the revised proposal on lightning impulse test procedure for cases where the tail time of the impulse wave-shape can not be obtained. The several editorial and technical comments included after the Memphis meeting were discussed and revised during the WG meeting. No changes were made during discussion. This revised version will be surveyed within the WG membership prior the next meeting. Furthermore the WG was informed that the table of minimum suggested impulse generator capacitance and energy levels was sent to Arthur Molden on March 10, 2006 for inclusion in the next revision of the impulse guide C57.98, as agreed during the Memphis meeting.

The last technical item on the agenda was the review of the comments falling under the WG responsibility received on the last C57.12.00 and C57.12.90 drafts for ballots during the meeting. A proposal with all the changes agreed during the discussion will be surveyed prior the next meeting within the WG.

Because the WG ran out of time, some comments on the survey on C57.12.90 could not be discussed and will be postponed to the next WG meeting.

7.12.2.4 Working Group for Revision of the Impulse Test Guides C57.98 and C57.138 – Art Molden, Chair; Joe Melanson, Secretary

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The meeting started at 3:15PM on Monday April 20th, with 21 attendees present of which 6 were members, 15 were guests of which 5 requested membership.

The ANSI patent policy slides were presented to our membership. The group had an opportunity to identify any patent conflicts and none were disclosed. There were no comments regarding the slides.

The group introductions were made.

A new draft of the guide had been made available to the members via the grouper web site. This draft was the first produced using the IEEE word processing template and included all the latest changes figures and tables current at that time.

The discussions started with a request by chairman Art Molden for help in producing some additional illustrations for sections of the guide. Reto Fausch, Ramon Garcia and Earnst Hanique volunteered to correct and create the figures in the required electronic format. As it now stands the major portion of work still to be done is to complete an Annex, produce the additional figures and to complete the editing and formatting as per the IEEE style guide. It is hoped that with this additional help offered by the members the guide will be complete and ready for a final review by the next meeting. The PAR for this project expires this year and a request for extension will be submitted shortly.

An item of new business was that as decided at the Memphis meeting, a table of minimum impulse generator capacitance and energy ratings produced by the working group for The Revision of Impulse Tests will now be included in our guide.

7.12.2.5 Working Group on Liquid-Filled Transformers Dielectric Test Tables – Phil Hopkinson, Chair; Scott Choinski, Secretary

The Working Group on Dielectric Test Tables, Liquid-Filled was called to order at 1:45 PM. There were 42 attendees, 21 members, 2 requesting membership and 19 guests. Reviewed the agenda for the meeting, and the IEEE patent policy. There were no patent issues presented. The Minutes from the October 25, 2005, meeting in Memphis, TN were approved.

The Working Group reviewed Subhash Tuli's proposed table combining the three tables in to one table. Straw poll indicated a clear majority preferred the three tables.

It was also agreed to remove Front Of Wave test requirements from the High Frequency table and place it in an appendix that will be inserted in C57.12.00.

Several mark-ups made to the tables during the meeting.

Phil Hopkinson will send revised charts to respective Chairs of C57.12.00 and C57.12.90, and post the revisions on the IEEE Transformers Committee's website.

It was agreed at the DTSC meeting that another survey on the table would be taken of the DTSC. It was noted that there have been several changes made to the tables. The chair urged members of the DTSC to vote on this and other DTSC surveys and cautioned that no response can be interpreted as a "don't care" vote.

7.12.3 Liaison Reports

7.12.3.2 Status of C57.12.00 – Dong Kim; and C57.12.90 – Stephen Antosz

Separate recirculation ballots will be sent in April 2006. These cover only issues from the 2002 ballots. The ballots will be sent to the same ballot pools as in 2002. The only items open for consideration are the ones that were commented on in 2002. All future changes are still being compiled in Draft 3 of both documents and will be balloted in the future.

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

A meeting took place in Lake Placid, NY during the week of November 14th, 2005. During a 5 day period some 12 to 15 active members of the working group reviewed and restructured all the new

Standard 4 text, arranging it into a format ready to be compiled into the IEEE word processor template. It is hoped that the first draft of this revision will be ready later this year. The Project Par expires this year and an extension request will be submitted shortly.

7.12.3.4 Surge Protection Devices – Bob Degeneff

Not present. No report.

7.12.4 Old Business

7.12.4.2 Simplification of C57.12.90, Mark Perkins proposal

The basic premise is to move tutorial information into appropriate guides. The focus issue right now is regarding high energy levels for impulse generators. It was pointed out that inclusion of this information in C57.98 was the only method by which this information can be included. There is not enough support within the DTSC to include it in C57.12.90.

7.12.4.3 Front of Wave Test Levels, Subhash Tuli

It was agreed at the last meeting that this issue would be dropped. Information pertaining to front of wave test and test levels will be put into an annex of C57.12.00.

7.12.5 New Business

7.12.5.1 Switching Impulse Test Configuration

Roger Hayes asked a series of questions on Switching Impulse Testing, regarding a standard test configuration for three-phase wye connected transformers. Depending on the test setup, it can result in higher phase-to-phase and/or higher phase-to-ground stresses. These must be known and accounted for at time of design. A poll was taken of those present at the meeting, and all manufacturers indicated that they test from phase to ground. It is proposed that C57.12.90 state clearly a standard test setup.

This issue was discussed, but no decisions made.

Chair's comment after the meeting: Further and closer inspection of Figs. 36 and 37 of C57.98 shows that the same voltages are applied whether voltage is applied phase to phase or phase to ground, provided of course that the correct magnitudes are applied in the first place. The figures are not very clear in the details, particularly in just where the E/3 voltage appears, and this should probably be modified to make the intent more clear. The chair's interpretation is that $E_{ph\text{-}ph} = 1.5\ E_{ph\text{-}gnd}$ in both cases.

7.12.6 Meeting Adjourned

8.0 Editor's Report – Spring 2006 Costa Mesa, CA Meeting

Between October 21, 2005 and March 18, 2006 a total of 46 papers in the transformer area were submitted to IEEE Transactions on Power Delivery for possible publication. By June 2, 2006, 42 reviews had been completed and 4 reviews are still in-progress. For completed reviews, the recommendations were: Accept without changes – 12; Revise and Resubmit – 23; and Reject - 7. A summary of the accepted papers is at the end of this report.

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

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

I would like to encourage those Reviewers that already have an account on IEEE Manuscript Central to keep their profile information updated and complete the areas for key words and areas of interest.

Respectfully Submitted,
John Crouse
Editor, IEEE Transactions on Power Delivery
john.crouse@ieee.org

INSTRUCTIONS FOR SIGNING UP TO REVIEW IEEE TRANSACTIONS PAPERS

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

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

4. Please specify any "Key Words" such as: distribution transformers, core losses, oil DGA, or thermal, for example.
5. Submit your information.
6. Click on "Request Reviewer Status" to be enabled as a reviewer.

Summary of Accepted Papers

	Number	Title	Key Words	Author	Decision	Date
1	TPWRD-00347-2005; Rev 1	Analysis of Some Measurement Errors in Bushing Power Factor Tests in the Field	bushings, pf	Dr. Shibao Zhang	Accept	12/05/05
2	TPWRD-00515-2005; Rev 1– 2	Proposition of Individual Loading Guide for Power Transformers	loading,	Shinichi Toujo	Accept	01/05/06
3	TPWRD-00169-2004; Rev 2	Calculation of Stress Dependent Life Cycle Costs of a substation component - Demonstrated for Controlled Energisation of Unloaded Power Transformers	economics,	Dr. Diego Politano	Accept	12/14/05
4	TPWRD-00400-2005; Rev 2	Research on Extraction Technique of Transformer Core Fundamental Frequency Vibration Based on OLCM	core, frequency, vibration	Shengchang Ji	Accept	01/17/06
5	TPWRD-00492-2005; Rev 1	Analysis of Ferroresonance Modes in Power Transformers Using Preisach-Type Hysteretic Magnetizing Inductance	hysteresis, ferroresonance, magentizing	Afshin Rezaei-Zare	Accept	02/23/06
6	TPWRD-00646-2005; Rev 1	New Controller for an Electronic Tap-changer Part I: Design Procedure and Simulation Results	tap changer	Jawad Faiz	Accept	03/27/06
7	TPWRD-00647-2006; rev 1	New Controller for an Electronic Tap-changer Part II: Measurement Algorithm and Test Results	tap changer	Jawad Faiz	Accept	03/27/06
8	TPWRD-00356-2005; Rev 2	A new On-Line Method based on Leakage Flux Analysis for the Early Detection and Location of Insulating Failures in Power Transformers		Prof. Manés Cabanas	Accept	02/23/06
9	TPWRD-00503-2005; Rev 2	Loading Guides and ANN Analysis Utilization for Oil-Immersed Distribution Transformer Condition Monitoring	loading, ANN, condition, distribution xfmr	Jouni K. Pylvänäinen	Accept	03/08/06
10	TPWRD-00521-2005; Rev 2	A Sequential Phase Energization Method for Transformer Inrush Current Reduction -Transient Performance and Practical Considerations	inrush current, transient analysis, ferroresonance, power quality	Wilsun Xu	Accept	04/17/06
11	TPWRD-00679-2005 R2	Analysis of Very Fast Transients in Layer-Type Transformer Windings.R2	transformer, very fast transients, high frequency model, ATP-EMTP	Dr. Marjan Popov	Accept	05/17/06
12	TPWRD-00081-2006.R1	Theoretical Calculation of Inrush Currents in Three- and Five-Legged Core Transformers	Transformer model, voltage sag, inrush current	Dr. Luis Sainz	Accept	05/16/06

9.0 Meetings Planning Subcommittee – G.W. Anderson

NO REPORT

10.0 Reports of Liaison Representatives

10.1 Standard Coordinating Committee No 4

10.1.1 Standards Coordinating Committee 04 – Insulation Systems - (Paulette Powell)

1. Scope:
   - To formulate guiding principles for the evaluation of insulation materials and systems for electrical and electronic applications.
   - To formulate principles for the identification of insulation materials and systems based on functional tests and/or experience.
   - To coordinate the preparation of standards for functional test programs and diagnostic methods for the evaluation of insulation materials and systems.

2. Activities:

   2.1. IEEE 1-1986 (R2000) Recommended Practice – General Temperature Limits in the Rating of Electrical Equipment and for the Evaluation of Electrical Insulation: reaffirmed September 22, 2005.

   2.2. IEEE 98-1984 (R1993) Standard for the Preparation of Test Procedures for the Thermal Evaluation of Solid Electrical Insulating Materials: revised and published May 31, 2002. Errata issued January 20, 2006 to correct an error noted in Annex B, Table B.1, Note 2. The intent is to pursue reaffirmation for 2007.

   2.3. IEEE 99-1980 (R1992) Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment: The ballot for reaffirmation closed January 15, 2005. Ballot comments have identified obsolete material necessitating revision of IEEE 99 rather than reaffirmation. A PAR has been submitted to revise the document.

3. Participation:

Anyone interested in joining the Subcommittee or the Working Group revising IEEE 99 should contact:

Paulette Payne Powell
Chairperson SCC 04
papayne@ieee.org
202-388-2335

Respectfully submitted,
Paulette Payne Powell

10.2 IEC – TC Technical Advisor to USNC

10.2.1 IEC TC-14 Technical Advisory Group Meeting Minutes

PLACE OF MEETING: Costa Mesa Hilton
3050 Bristol Street
Costa Mesa, CA 92626
B-2 Balboa

DATE AND TIME: Wednesday, March 22, 2006
3:00 PM

PRESIDING OFFICER: P. Hopkinson, Technical Advisor

Members Present:

D. Aho	Cooper Power Systems
S. Choinski	NEMA Staff, TAG Administrator
J. Corkran	Cooper Power Systems
D. Foster	Olsun Electrics Corporation
P. Hopkinson	Hvolt, Inc., TA
S. Kennedy	Niagara Transformer Corporation
R. Marek	Dupont Advanced Fibers Systems
H.J. Sim	Waukesha Electric Systems
B. Simpson	Innovative Paper Technologies

Members Absent:

C. Colopy	Cooper Power Systems
J. Foldi	Foldi & Associates
R. Girgis	ABB
J. Lackey	PowerNex Associates Inc
G. Morehart	ACME Electric Corporation

Others present:

K. Brown	Tennessee Valley Authority
L. Davis	Reuel, Inc.
K. Haggerty	DuPont
G. Hoffman	Advanced Power Technologies
T. Holifield	Howard Industries
D. Marlow	Prolec GE
P. McShane	Cooper Power Systems
A. Molden	AMEESCO
H. Nordman	ABB, Finland
J. Patwardhan	Schneider-Electric
S. Razuvayev	Delta Star, Inc.
L. Rechsiedller	Manitoba Hydro
D. Stinson	Tennessee Valley Authority
R. Wicks	DuPont
K. Yue	Bechtel Power

1. CALL TO ORDER

The meeting was called to order, meeting guidelines reviewed and attendance recorded.

2. APPROVAL OF THE AGENDA

The Agenda was approved as written.

4. APPROVAL OF THE PREVIOUS MINUTES

Minutes of the meeting held October 26, 2005 in Memphis, TN were approved as written.

5. REVIEW AND UPDATE OF USNC ROSTERS FOR TC 14

TAG roster was circulated and necessary corrections annotated.

6. BERND BORCHERT OF THE UK NAMED NEW SECRETARY ON 1/11/06

The appointment of a new Secretary was noted. Mr. Borchert succeeds Nick Bradfield.

7. REVEW OF PLENARY MEETING HELD IN CAPETOWN, SOUTH AFRICA, OCTOBER 20-21, 2005

a. PJ Hopkinson named Convenor of Maintenance Team 5 for IEC 60076-1 "Power transformers - Part 1: General." Presently soliciting working group members. Issues include environmental considerations and reference temperature for kVA and losses. Corresponding IEEE documents are C57.12.00 and C57.12.01. Hopkinson to make changes to the IEC document, circulate and solicit members to join the MT. Planning for 2 WG meetings per year.

b. 60076-14 TS Ed.2 Rick Marek's High Temperature Liquid Filled Transformer Group back in business. The work will be accomplished in MT4 and next meeting will be late May/early June in the Ukraine. There is no participation for fluids and assistance from Cooper was solicited.

This document was originally published as a test spec and not a standard. There were comments from the balloting process that required investigation and it was decided to publish as a test spec rather than delay publication.

c. Self Protected Liquid Filled Transformers headed for FDIS. Some work is needed to address US concerns for the next revision.

d. 60076-5 Short Circuit approved. TAG Administrator to check on publication status.

e. Hasse Nordman's Liquid Filled Transformer Loading Guide approved. TAG administrator to check on publication status.

f. 60076-6 Reactors by Chris Ploetner accepted. Next stage will be CDV.

g. K. Toda's WG 30 Gas Filled Power Transformer Transformer work was approved. Next stage will be CDV.

h. 14/515/NP Transformers connected to wind generators. Reviewed Hopkinson's pesentation "Ping Test" to discuss transformer/circuit breaker interaction. This presentation is posted under the Performance Characteristics Subcommittee site.

i. 14/517/INF Liaison reports: Many items presented by liaison representative, Sam Hall of the UK on TC 10 (Insulating fluids) with work on Mineral oil, Silicone, and Natural Ester Members engaged in an extended discussed of sulphur in transformer oil. Testing does not always expose problems with sulphur and further study is required.

8. OPEN DOCUMENTS/Issues- - - Sulphur !

This sulphur issue was discussed above.

9. OTHER BUSINESS

There was not other business

9. DATE AND PLACE OF THE NEXT MEETING

The next meeting will be during the Fall IEEE PES Transformer Committee meeting October 2006 in Montreal, Canada.

9. ADJOURN

The meeting adjorned at 4:17 pm.

Reported By: S. Choinski March 22, 2006

10.3 Cigre

NO REPORT

11.0 Old Business

There were no items of Old Business brought up

12.0 New Business

There were no items of New Business brought up

IEEE / PES Transformers Committee
Approved
Meeting Minutes
Attachments

IEEE/PES TRANSFORMERS COMMITTEE
Status Report of Standards

March 2006
Costa Mesa, CA

3/10/2006

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
SubCommittee Chair	**AUDIBLE SOUND & VIBRATION** *Puri J.*	(704) 821-6638 manopuri@worldnet.att.net			
P57.151	IEEE Guide for Sound Level Measurement for Liquid Immersed Transformers and Reactors	Puri J. (704) 821-6638 manopuri@worldnet.att.net	12/7/2005 12/31/2005		New Project - Active PAR Std under development Request for PAR submitted in 10/10/05. Pending approval at December '05 SA Board meeting.
C57.136	IEEE Guide for Sound Level Abatement and Determination for Liquid- Immersed Power Transformers and Shunt Reactors Rated Over 500 kVA	Darwin A.W. 44 1785 274370 alan.darwin@areva-td.com	2000 12/31/2005		Approved - Reaffirmed September '05 Reaffirmation approved by RevCom on 9/21/2005
SubCommittee Chair	**BUSHING** *Elliott F. E.*	(360) 619-6099 felliott@ieee.org			
C57.19.00	Standard General Requirements and Test Procedure for Power Apparatus Bushings	Ellis K. P. (615) 847-2157 keithcota@aol.com	2004 12/31/2009		Approved - Active Formally Std. IEEE 21 Previous revision 1991. D6.1 approved by RevCom in Dec., 2004
C57.19.01	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings	Singh P. (731) 696-5228 pritpal.singh@us.abb.com	2000 12/31/2010		Approved Formally Std. IEEE 24 Reaffirmed in 2005.
C57.19.03 PC57.19.03-199	IEEE Standard Requirements, Terminology, and Test Code for Bushings for DC Applications	Elliott F. E. (360) 619-6099 felliott@ieee.org	1996 12/31/2007	2/27/2004 12/31/2007	Approved - Active PAR for Corrigenda Corrigenda of Standard - pending final approval from RevCom
C57.19.100	IEEE Guide for Application of Power Apparatus Bushings	Spitzer T. (817) 215-6457 tommy.spitzer@oncorgroup.com	1995 12/31/2008		Approved Revision for C57.19.101-1992

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
SubCommittee Chair	**DIELECTRIC TESTS** *Wagenaar L. B.*	(614) 552-1759 lbwagenaar@ieee.org			
C57.113	IEEE Guide for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors	Lemke E. +49 35207 8630 manage@cdic.de	1991 12/31/2007	6/20/1996	Approved - Active
C57.127 PC57.127	IEEE Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers	Harley J. W. (330) 657-2471 jack@harleyinc.com	2000 12/31/2007	2/13/2003 12/31/2007	Approved PAR to Revise IEEE Std C57.127-2000
C57.138	IEEE Recommended Practice for Routine Impulse Test for Distribution Transformers	Molden A. (845) 225-0993 a.molden@ieee.org	1998 12/31/2010		Approved - Reaffirmed in June '05 Reaffirmation approved by RevCom on 6/8/05.
C57.98 PC57.98	IEEE Guide for Transformer Impulse Tests	Molden A. (845) 225-0993 a.molden@ieee.org	1994 12/31/2006	9/12/2002 12/31/2006	Approved - Active PAR to revise std. PAR to Revise IEEE Std C57.98-1994

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
SubCommittee Chair	**DISTRIBUTION TRANSFORMERS** ***Hanus K. S.***	(817) 215-4444 ken.hanus@ieee.org			
PC57.12.33	Guide for Distribution Transformer Loss Evaluation	Pekarek T. J. (330) 761-7800 tjpekarek@firstenergycorp.com		6/25/1998 12/31/2004	PAR Withdrawn - Inactive WG Decision made at Las Vegas Meeting to discontinue this activity. PAR administratively withdrawn on 12/7/04 NesCom Meeting
PC57.12.36	Standard Requirements for Liquid-Immersed Distribution Substation Transformers	Aho D. (262) 524-4201 daho@cooperpower.com		6/13/2002 12/31/2006	New Project - Active PAR Std under development Need to start the balloting process soon. PAR to expire Dec., 2006
C57.12.20 PC57.12.20	Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller, High-Voltage 34 500 Volts and Below; Low-Voltage, 7970/13 800 Y Volts and Below	Wilks A. L. (731) 285-9121 awilks@ermco-eci.com	2005 12/31/2010		Approved
C57.12.25 PC57.12.38	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 SmallerRequirements	Ghafourian A. A. (731) 285-9121 aghafourian@ermco-eci.com		8/1/2005 12/31/2009	Approved - New Active PAR for revision Original PAR PC57.12.25 administratively withdrawn on 12/7/04 NesCom Meeting. New PAR PC57.12.38 approved 8/1/05. Note new PAR number.
C57.12.28 PC57.12.28	Standard for Pad Mounted Equipment - Enclosure Integrity	Olen O. (262) 835-3362 rolen@cooperpower.com	2005 12/31/2010		Approved - Active Previously NEMA/ANSI C57.12.28-1999
C57.12.29 PC57.12.29	Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments	Olen O. (262) 835-3362 rolen@cooperpower.com	2005 12/31/2010		Approved - Active Previously NEMA/ANSI C57.12.29-1991
C57.12.31	IEEE Standard for Pole Mounted Equipment - Enclosure Integrity	Olen O. (262) 835-3362 rolen@cooperpower.com	2002 12/31/2007		Approved - Active
C57.12.32	Standard for Submersible Equipment - Enclosure Integrity	Olen O. (262) 835-3362 rolen@cooperpower.com	2002 12/31/2007		Approved - Active
C57.12.34 PC57.12.34	Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase DistributionTransformers, 2500 kVA and Smaller: High-Voltage, 34 500GrdY/19 920 Volts and Below; Low Voltage, 480 Volts and Below	Shull S. (417) 625-6110 sshull@empiredistrict.com	12/31/2009	3/19/2005 12/31/2009	Approved - Active PAR for revision Originally Std. 1447, Combined C57.22-1980 & C57.12.26-1992 PC57.12.34/D11 approved by RevCom 9/22/2004 for publication. New PAR for revision approved 3/19/2005.

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
SubCommittee Chair	**DISTRIBUTION TRANSFORMERS** ***Hanus K. S.***	(817) 215-4444 ken.hanus@ieee.org			
C57.12.35 PC57.12.35	IEEE Standard for Bar Coding for Distribution Transformers	Matthews P (601) 422-1533 lmatthews@howard-ind.com	1996 12/31/2009	3/4/2005 12/31/2009	Approved - Active PAR for revision C57.12.35-1996 reaffirmation approved by RevCom 6/23/2004 Formally P1265 New PAR for revision approved on 2/22/05.
C57.15 PC57.15	IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators	Colopy C. A. (262) 896-2342 ccolopy@cooperpower.com	1999 12/31/2006	6/8/2005 12/31/2009	Approved - Active PAR to revise std. A new PAR was approved 6/8/05 due to scope changes. Original PAR withdrawn.
IEEE 1388 PC57.12.37	IEEE Standard for the Electronic Reporting of Transformer Test Data	Hollingsworth R. (601) 422-1105 rhollin@howard-ind.com	2000 12/31/2005	11/1/2001 12/31/2006	Approved - Active PAR for revision Active PAR to revised IEEE Std 1388-2000 Formally C57.132. Document under went RevCom approval in June '05, but was disapproved due to new negative in the D11c recirculation. New recirculation with D11d completed in Nov., 2005. Pending approval by RevCom in March 2006 SA Board meeting. Also requested entension to 12/31/2006

3/10/2006

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
SubCommittee Chair	**DRY TYPE TRANSFORMERS** *Johnson, Jr. C. W.*	(276) 688-1512 charles.w.johnson@us.abb.com			
C57.12.01 PC57.12.01	IEEE Standard General Requirements for Dry-Type Distribution and Power Transformers Including Those with Solid Cast and/or Resin Encapsulated Windings	Sullivan J. C. (813) 884-5424 jcsullivan@ieee.org	2005 12/31/2010	3/18/1999 12/31/2005	Approved Previous 1998 version was successfully revised and approved in 2005.
C57.12.56 PC57.12.60	IEEE Standard Test Procedure for Thermal Evaluation of Insulation Systems for Ventilated Dry-Type Power and Distribution Transformers	Wicks R. C. (804) 383-3300 roger.c.wicks@usa.dupont.com	1981 12/31/2007	12/10/2003 12/31/2007	Approved Being revised by PC57.12.60 (PAR approved Dec, 2003)
C57.12.58	IEEE Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil	Kline A. D. (843) 705-2698 AKLINE1490@AOL.COM	1991 12/31/2007		Approved
C57.12.59	IEEE Guide for Dry-Type Transformer Through-Fault Current Duration	Powell P. A. (202) 388-2335 papayne@ieee.org	2001 12/31/2006		Approved - Active Need either reaffirmation or revision before October, 2006
C57.12.60 PC57.12.60	IEEE Guide for Test Procedures for Thermal Evaluation of Insulation Systems for Solid Cast and Resin-Encapsulated Power and Distribution Transformers	Wicks R. C. (804) 383-3300 roger.c.wicks@usa.dupont.com	1998 12/31/2007	12/10/2003 12/31/2007	Approved - Active PAR for Revision of Std PAR to Revise IEEE Std C57.12.56-1986 and IEEE Std C57.12.60-1998
C57.12.91 PC57.12.91a	IEEE Standard Test Code for Dry-Type Distribution and Power Transformers	Foster D. R. (815) 678-2421 dfoster@olsun.com	2001 12/31/2006	6/8/2005 12/31/2009	Approved - Active PAR for Amendment PAR for Amendment 1 approved on 6/8/05.
C57.124	IEEE Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers	Kline A. D. (843) 705-2698 AKLINE1490@AOL.COM	1991 12/31/2007		Approved
C57.134	IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers	Powell P. A. (202) 388-2335 papayne@ieee.org	2000 12/31/2006		Approved Need reaffirmation before Oct., 2006 Reaffirmation ballot pool invitation initiated in October, 2005.
C57.16	IEEE Standard Requirements, Terminology, and Test Code for Dry-Type Air- Core Series-Connected Reactors	Dudley R. F. (416) 298-8108 richardd@ca.trenchgroup.com	1996 12/31/2006		Approved Need reaffirmation or revision before October 2006.
C57.94	IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type General Purpose Distribution and Power Transformers	Lewis T. D. (910) 738-4251 tlewis@acmepower.com	1982 12/31/2005		Approved Reaffirmation ballot pool invitation initiated in October, 2005.
C57.96	IEEE Guide for Loading Dry Type Distribution and Power Transformers	Prevost T. A. (802) 751-3458 tprevost@ieee.org	1999 12/31/2009		Approved - Active RevCom approved reaffirmation on 9/22/2004 Previous revision in 1994.

3/10/2006

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
SubCommittee Chair	**DRY TYPE TRANSFORMERS** ***Johnson, Jr. C. W.***	(276) 688-1512 charles.w.johnson@us.abb.com			
IEEE 259	IEEE Standard Test Procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General-Purpose Transformers	Simpson, Jr. R. W. (603) 286-4362 bsimpson@quin-t.com	1999 12/31/2009		Approved 9/22/04 - RevCom approved reaffirmation
SubCommittee Chair	**HV CONVERTER TR & REACTORS** ***Dudley R. F.***	(416) 298-8108 richardd@ca.trenchgroup.com			
C57.129 PC57.129	IEEE General Requirements and Test Code for Oil Immersed HVDC Converter Transformers	Dudley R. F. (416) 298-8108 richardd@ca.trenchgroup.com	1999 12/31/2008	6/24/2004 12/31/2008	Approved - Active PAR for Revision PAR for revision of C57.129-1999 approved on 6/23/2004
IEEE 1277 P1277	IEEE General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission	Dudley R. F. (416) 298-8108 richardd@ca.trenchgroup.com	2000 12/31/2005	11/10/2005 12/31/2009	Approved. Active PAR for revision PAR requested for revision. PAR approval pending December 2005 SA Board Meeting.
SubCommittee Chair	**INSTRUMENT TRANSFORMERS** ***Smith J. E.***	(601) 346-9104 jes1@ieee.org			
C57.13 PC57.13	IEEE Standard Requirements for Instrument Transformers	Nelson T. N (301) 975-2986 thomas.nelson@nist.gov	1993 12/31/2008	12/10/2003 12/31/2007	Approved - Active PAR to revise std. PAR to Revise IEEE Std C57.13-1993
C57.13.2 PC57.13.2	Conformance Test Procedure for Instrument Transformers	Khalin V. M. (859) 879-2797 vladimir@kuhlman.com	2005 12/31/2010	5/15/2003 12/31/2007	Approved - Active PAR to Revise Std C57.13.2-1991; harmonize with C57.13-1993 D4 approved by RevCom on 6/8/2005 Published 9/29/2005.
C57.13.5	Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above	Riffon P. (514) 840-3000 x3424 riffon.pierre@hydro.qc.ca	2003 12/31/2005	12/7/2005 12/31/2009	Approved - PAR for Revision requested October '05 Reference Std. 1400 Previously C57.13.5 was a trial use
C57.13.6	Standard for High Accuracy Instrument Transformers	Ten Haagen C. W. (603) 749-8433 chris.tenhaagen@indsys.ge.com	12/31/2010		Approved - Active Document published in Dec. 2005

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
SubCommittee Chair	**INSULATING FLUIDS** *Gryszkiewicz F. J.*	(617) 393-3161 frankjg@ieee.org			
PC57.130	IEEE Trial-Use Guide for the Use of Dissolved Gas Analysis During Factory Temeprature Rise Tests for the Evaluation of Oil-Immersed Transformers and Reactors	Gryszkiewicz F. J. (617) 393-3161 frankjg@ieee.org		1/30/2000 12/31/2005	New Project - Std under development New Project - Std under development - currently under ballot resolution. PAR extension requested to 12/31/2006; pending approval
PC57.139	Guide for Dissolved Gas Analysis in Transformer Load Tap Changers	Jakob F. (916) 455-2284 fjakob@weidmann-acti.com		12/11/2002 12/31/2007	New Project - Std under development
PC57.146	Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers	Bartley W. H. (860) 722-5483 william_bartley@hsb.com	2005 12/31/2010		Approved - Active Doc in D3 ballot resolution, 96% affirmative D3a - approved by RevCom on 9/21/05.
PC57.147	Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers	McShane C. P. (262) 524-4591 cpmcshane@cooperpower.com		12/10/2003 12/31/2007	New Project - Active PAR Std under development
C57.104 PC57.104	IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers	Ladroga R. K. (617) 393-3133 rladroga@doble.com	1991 12/31/2005	12/10/1996 12/31/2005	Withdrawn - New PAR to revise std. PAR to Revise IEEE Std C57.104-1991 PAR extension granted on 9/24/2004 - new expiration 12/31/2005. PAR and document withdrawn in Dec. 2005
C57.106 PC57.106	IEEE Guide for Acceptance and Maintenance of Insulating Oil in Equipment	Jakob F. (916) 455-2284 fjakob@weidmann-acti.com	2002 12/31/2007	12/11/2002 12/31/2006	Approved PAR to revise C57.106-2002. WG Chair from IEEE record shows J. Kely and J. Thompson. Par due to expire in 2006.
C57.111	IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers	Gryszkiewicz F. J. (617) 393-3161 frankjg@ieee.org	1983 12/31/2008		Approved
C57.121	IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers	McShane C. P. (262) 524-4591 cpmcshane@cooperpower.com	1998 12/31/2006		Approved Was to be administratively withdrawn in Dec., 2004 Reaffirmation ballot pool invitation initiated in October, 2005. Requested Extension to Dec., 2006
IEEE 637	IEEE Guide for the Reclamation of Insulating Oil and Criteria for Its Use	Pearce H. A. (412) 376-3182	1985 12/31/2007		Approved

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark	3/10/2006
SubCommittee Chair	**INSULATION LIFE** *Platts D. W.*	(610) 774-4686 donplatts@ieee.org				
PC57.145	Guide for the Definition of Thermal Duplicate Liquid-Immersed Distribution, Power, and Regulating Transformers	Beaster B. L. (601) 422-1302 blbeaster@ieee.org	0	6/25/1998 12/31/2004	New Project - Active PAR Std under development Previously P1524 Modified PAR to expire in 2004 PAR administratively withdrawn in December, 2004	
C57.100 PC57.100	IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution and Power Transformers	Wicks R. C. (804) 383-3300 roger.c.wicks@usa.dupont.com	1999 12/31/2008	12/8/2004 12/31/2008	Approved - Active PAR for Revision Requested PAR for revision on 10/18/2004. PAR approved 12/8/2004	
C57.119	IEEE Recommended Practice for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Ratings	Tuli S. C. (262) 547-0123 x1428 subhash.tuli@waukeshaelectric.spx.com	2001 12/31/2006		Approved Need revision or reaffirmation	
C57.91 PC57.91	IEEE Guide for Loading Mineral-Oil-Immersed Transformers	Raymond T. (518) 884-0297 tc.raymond@ieee.org	1995 12/31/2007	5/2/2005 12/31/2009	Approved - Active PAR for revision Combined from C57.91-1981 & C57.92-1981 & C57.115-1991 Reaffirmation approved by RevCom 6/23/2004 New PAR for revision approved 5/2/2005.	
C57.91-1995/Co	IEEE Guide for Loading Mineral-Oil-Immersed Transformers--Corrigendum 1	Pierce L. W. (706) 235-1805 piercelw@aol.com	2002 12/31/2007		Approved - Active In conjunction with C57.91 - reaffirmed in 6/2004. Currently under revision	
IEEE 1276	IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Power Transformers	Franchek M. A. (802) 751-3539 mfranchek@weidmann-systems.com	1997 12/31/2005		Approved Upgrade from trial use to full use on 3/30/2000 Was to be administratively withdrawn, requested extension to Dec., 2006 Need reaffirmation RevCom submittal. Per M. Franchek - reaffirmation ballot has negatives, but resolved. Will submit for RevCom approval before 10/17/05 deadline.	
IEEE 1538	IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid Filled Transformer	Platts D. W. (610) 774-4686 donplatts@ieee.org	2000 12/31/2005		Approved Reaffirmation successful in 2005	

STANDARD / PROJECT	TITLE	Working Group Chair / Phone / Email	Pub Year / Rev Due Date	PAR Issue Date / PAR Expiration	Standard Status / Remark
					3/10/2006
SubCommittee Chair	**PERFORMANCE CHARACTERISTICS** ***Girgis R. S.***	(314) 679-4803 ramsis.girgis@us.abb.com			
PC57.133	Guide for Short-Circuit Testing of Distribution and Power Transformers	Prevost T. A. (802) 751-3458 tprevost@ieee.org		3/4/2005 12/31/2009	Active PAR for revision New PAR for revision approved on 2/22/05.
PC57.142	A Guide To Describe The Occurrence And Mitigation Of Switching Transients Induced By Transformer-Breaker Interaction	Degeneff R. C. (518) 276-6367 degenr@rpi.edu		12/7/2000 12/31/2006	New Project - Active PAR Std under development PAR extension granted 9/23/2004 - new expiration @2006
PC57.149	Guide for the Application and Interpretation of Frequency Response Analysis for Oil Immersed Transformers	Sweetser C.L. (617) 393-2966 csweetser@doble.com		6/23/2004 12/31/2008	New Project - Active PAR PAR approved by NesCom 6/23/2004 Std under development
C57.105	IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems	Reitter G. J. (650) 508-2850 greitter@deltastar.com	1978 12/31/2006		Approved Was to be administratively withdrawn in Dec., 2004. Request extension to 2006. Reaffirmation ballot pool invitation initiated in October, 2005.
C57.109	IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration	Patel B. K. (205) 987-8012 bkpatel8012@charter.net	1993 12/31/2006		Approved Reaffirmation ballot pool invitation initiated in October, 2005.
C57.110 PC57.110	IEEE Recommended Practice for Establishing Transformer Capability When Supplying Nonsinusoidal Load Currents	Marek R. P. (804) 383-2376 Richard.P.Marek@usa.dupont.com	1998 12/31/2008	11/18/2004 12/31/2008	Approved - Active PAR for Revision PAR approved 11/18/2004.
C57.123	IEEE Guide for Transformer Loss Measurement	TeNyenhuis E.G. (519) 837-4691 ed.g.tenyenhuis@ca.abb.com	2002 12/31/2007		Approved Ref Std. IEEE 1098 WG Chair record from IEEE shows R. Girgis
C57.18.10 C57.18.10a	IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers	Kennedy S. P. (716) 896-6500 skennedy@niagaratransformer.com	1998 12/31/2008	3/4/2005 12/31/2009	Approved - Active PAR for Amendment Replaced the C57.18-1964 for pool cathode mercury-arc rectifiers. New PAR for Amendment 1: Technical and Editorial Corrections was approved 2/22/05
C57.21 PC57.21	IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA	Dudley R. F. (416) 298-8108 richardd@ca.trenchgroup.com	1990 12/31/2007	9/11/2003 12/31/2007	Approved - Active PAR to revise std PAR to Revise IEEE Std C57.21-1990 Reaffirmation approved on 6/23/2004
IEEE 32 PC57.32	IEEE Standard Requirements, Terminology, and Testing Procedures for Neutral Grounding Devices	Schappell S. M. (919) 580-3240 schappell@ieee.org	1972 12/31/2006	12/11/2002 12/31/2006	Approved - Active PAR to revise std PAR to Revise IEEE Std 32-1972 Dec. 2002 - Sponsor changed from PES/SPD to PES/TR Being revised under PC57.32

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SubCommittee Chair	**POWER TRANSFORMERS** *Lundquist T.*	(602) 236-8617 tom.lundquist@ieee.org			3/10/2006
PC57.12.10	Standard Requirements for Liquid-Immersed Power Transformers	Arteaga J. (601)422-1920 javier.arteaga@ieee.org	1997	6/13/2002 12/31/2006	New Project - Std under development formally NEMA/ANSI document. PAR will soon expire. Need to pursue PAR extension
PC57.140	Evaluation and Reconditioning of Liquid Immersed Power Transformers	James R.I. (504) 576-6246 r.james@ieee.org		9/16/1999 12/31/2006	New Project - Active PAR Std under development D14 currently in ballot resolution. PAR extension to 12/31/2006 requested; pending approval
PC57.143	Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components	Chu D. (212) 460-3456 chud@coned.com		3/21/2002 12/31/2007	New Project - Active PAR Std under developemnt
PC57.148	Standard for Control Cabinets for Power Transformers	Watson J.D. (561) 691-2206 joe_watson@ieee.org		2/27/2004 12/31/2007	New Project - Active PAR Std under development
PC57.150	Guide for the Transportation of Large Power Transformers and Reactors	Anderson G. W. (402) 680-1111 gwanderson@ieee.org		11/18/2004 12/31/2008	New Project - PAR approved in Nov. 2004 PAR approved by NesCom in Nov., 2004
C57.116	IEEE Guide for Transformers Directly Connected to Generators	Raymond T. (518) 884-0297 tc.raymond@ieee.org	1989 12/31/2006		Approved Reaffirmation ballot closed. Currently in comment resolution. Expect RevCom submittal by 10/17/05.
C57.117	IEEE Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems	Binder, Jr. W. B. (724) 654-3839 wbbinder@aol.com	1986 12/31/2006		Approved original approval date 6/19/1986 Reaffirmation ballot pool formed. Need WG Chair
C57.120	IEEE Loss Evaluation Guide for Power Transformers and Reactors	Lau M. Y. (604) 528-3201 mike.lau@bchydro.bc.ca	1991 12/31/2005		Approved Working Gorup Chair/Technical Contact: Roger G. Jacobsen not in participant roster 206-822-7628 Ref Std. 842 M. Lau/ West Cost WG assigned to head up reaffirmation at S'05 JacksonMeeting Reaffirmation ballot closed 7/25/05. Currently in comment resolution. Will need RevCom submittal before 10/17/05 deadline.
C57.125	IEEE Guide for Failure Investigation, Documentation, and Analysis for Power Transformers and Shunt Reactors	Binder, Jr. W. B. (724) 654-3839 wbbinder@aol.com	1991 12/31/2006		Approved Was to be withdrawn in Dec., 2004 Requested extension to 2006 - Need decision to reaffirm
C57.131 PC57.131	IEEE Standard Requirements for Load Tap Changers	Traub T. P. (312) 266-7647 tptraub@ix.netcom.com	1995 12/31/2007	5/15/2003 12/31/2007	Approved - Active PAR to revise std PAR to Revise IEEE Std C57.131-1995

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SubCommittee Chair	**POWER TRANSFORMERS** *Lundquist T.*	(602) 236-8617 tom.lundquist@ieee.org			
C57.135	IEEE Guide for the Application, Specification and Testing of Phase- Shifting Transformers	McIver 702-227-2316 mciver@nevp.com	2001 12/31/2006		Approved - Active Approved for IEEE/IEC Dual Logo Dec. 2005 - IEC 62032 Ed. 1 Need PAR for revision
C57.93 PC57.93	IEEE Guide for Installation of Liquid-Immersed Power Transformers	Lau M. Y. (604) 528-3201 mike.lau@bchydro.bc.ca	1995 12/31/2006	6/13/2002 12/31/2006	Approved - Active PAR to revise std Rev of ASA C57.93-1958, IEEE Std C57.12.11-1980, & C57.12.12-1980 PAR to Revise IEEE Std C57.93-1995
IEEE 638	IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations	Lundquist T. (602) 236-8617 tom.lundquist@ieee.org	1992 3/31/2005		Approved - Active - with errata dated 4/7/1999 Std. was to be withdrawn in December of 2005. Currently in reaffirmation process. Anticipate approval in March SA Board meeting
SubCommittee Chair	**STANDARDS** *Chiu B.*	(626) 308-6086 bill.chiu@sce.com			
C57.12.00 PC57.12.00	IEEE Standard General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers	Kim D. (626) 302-8049 dong.kim@sce.com	2000 12/31/2005	6/14/2001 12/31/2005	Approved - Active PAR to revise IEEE Std C57.12.00 - 2000 Under ballot resolution from 2002 ballot - D3 completed; pending recirculation. Request PAR extension to Dec. 2006
C57.12.70	IEEE Standard Terminal Markings and Connections for Distribution and Power Transformers	Traub T. P. (312) 266-7647 tptraub@ix.netcom.com	2000 12/31/2005		Approved Reaffirmation pending RevCom approval. Std. expiration date extended to YE 2006.
C57.12.80 PC57.12.80a	IEEE Standard Terminology for Power and Distribution Transformers	Raymond T. (518) 884-0297 tc.raymond@ieee.org	2002 12/31/2007	10/10/2005 12/31/2009	Approved - Active amendment PAR Amendment PAR approved to add thermally upgraded definition
C57.12.90 PC57.12.90	IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers	Tuli S. C. (262) 547-0123 x1428 subhash.tuli@waukeshaelectric.spx.com	1999 12/31/2005	6/14/2001 12/31/2005	Approved - Active PAR to revise std. PAR to Revise IEEE Std C57.12.90-1999 Currently under ballot resolution to resolve negatives from 2002 ballot. Draft 3 99% complete. Recirculation pending the WG volte on moving Clause 15 to PC57.12.00 PAR extension requested to 12/31/2006; pending approval.
C57.144	Guide for Metric Conversion of Transformer Standards	Olson T. (204) 474-4080 tolson@hydro.mb.ca	2004 12/31/2009		Approved - Active
IEEE 62	IEEE Guide for Diagnostic Field Testing of Power Apparatus - Part 1: Oil Filled Power Transformers, Regulators, and Reactors	Binder, Jr. W. B. (724) 654-3839 wbbinder@aol.com	1995 12/31/2010		Approved Reaffirmation was successful. Approval by RevCom on 3/19/05.

STANDARD PROJECT	TITLE	Working Group Chair Phone Email	Pub Year Rev Due Date	PAR Issue Date PAR Expiration	Standard Status Remark	*3/10/2006*
SubCommittee Chair	**UNDERGROUND TR & NW PROTECT** ***Niemann C. G.***	(847) 683-2145 carlpumco@sbcglobal.net				
C57.12.23 PC57.12.23	IEEE Standard for Underground Type, Self-Cooled, Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage 25kV and Below; Low Voltage 600V and Below	Traut A. (859) 879-2912 alant@kuhlman.com	2002 12/31/2007	3/4/2005 12/31/2009	Approved - Active PAR for revision	
C57.12.24 NONE	Requirements for Transformers - Underground-Type, Three Phase Distribution Transformers: High Voltage (34 500 GrdY/19 920 V and Below) and Low Voltage (480V and Below, 2500 kVA and Smaller	Termini G. (610) 941-1524 giuseppe.termini@peco-energy.com	1994 12/31/2000		Standard withdrawn in 2001 Existing standard withdrawn by IEEE on 1/15/2001. No longer endorsed by IEEE. New working group formed to address revision. Need an approved PAR from IEEE SA Board.	
C57.12.40 PC57.12.40	Standard for Requirements for Secondary Network Transformers - Subway and Vault Types (Liquid Immersed)	Klaponski B. (204) 633-7220 brian.klaponski@carte.ca	1993 12/31/2005	12/10/2001 12/31/2005	Approved. Standard is revision process. Expect RevCom approval in March, 2006. PAR extension requested to Dec., 2006	
C57.12.44 PC57.12.44	IEEE Standard Requirements for Secondary Network Protectors	Mulkey D. H. (415) 973-4699 DHM3@PGE.COM	2005 12/31/2006		Approved - pending final publication PC57.12.44/D2.1 approved by RevCom in December 2005. Previous revision in 2000.	
C57.12.57 NONE	Requirements for Ventilated Dry-Type Network Transformers 2500 kVA and Below, Three-Phase with High Voltage 34 500 Voltas and Below, Low Voltage 216Y/125 and 480Y/125 Volts	Robinson A. L. (361) 289-4001 alrobinson@aep.com	1992 12/31/2000		Standard withdrawn in 2001 Existing standard withdrawn by IEEE on 1/15/2001. No longer endorsed by IEEE. New working group formed to address revision. Need new PAR.	

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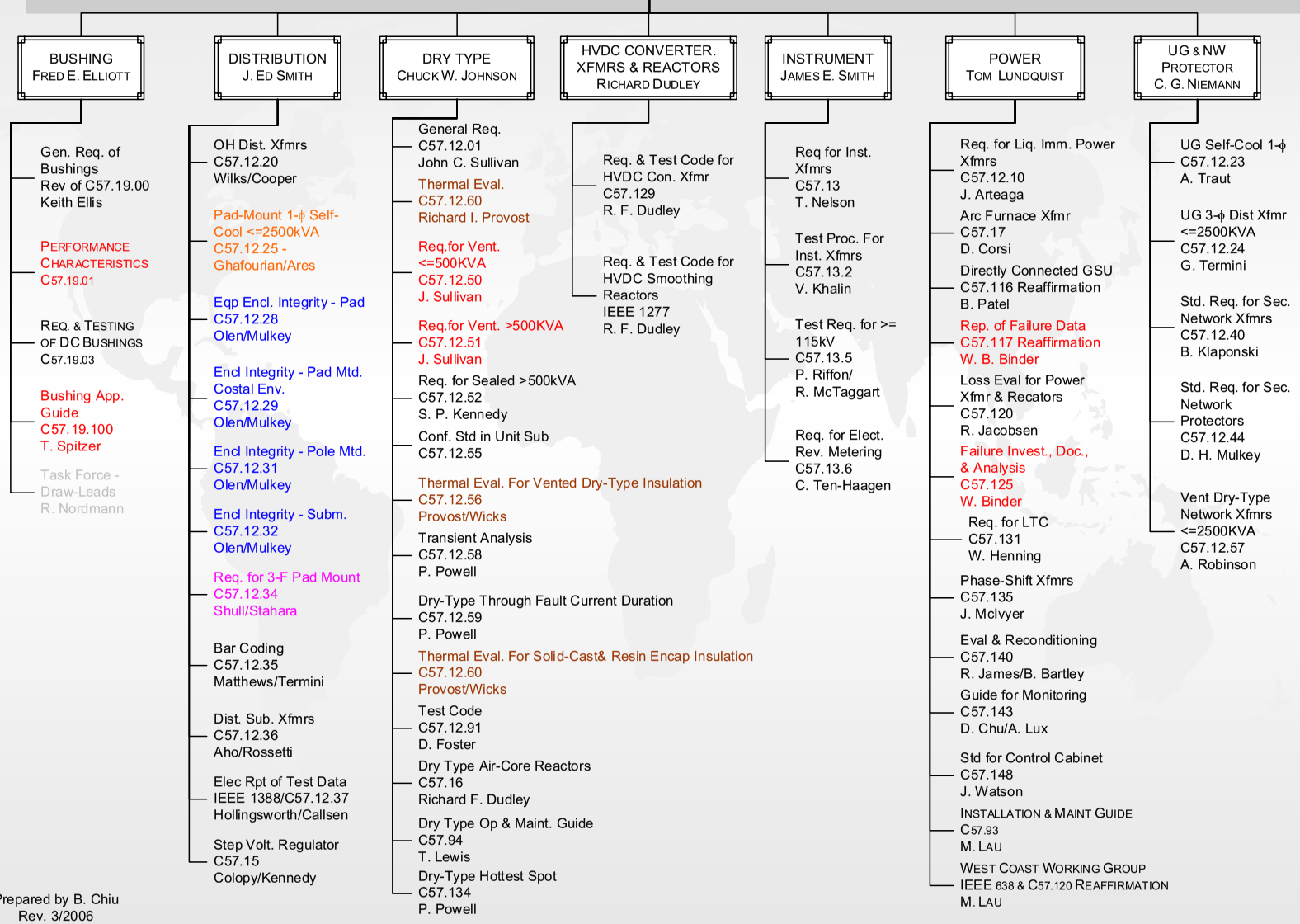

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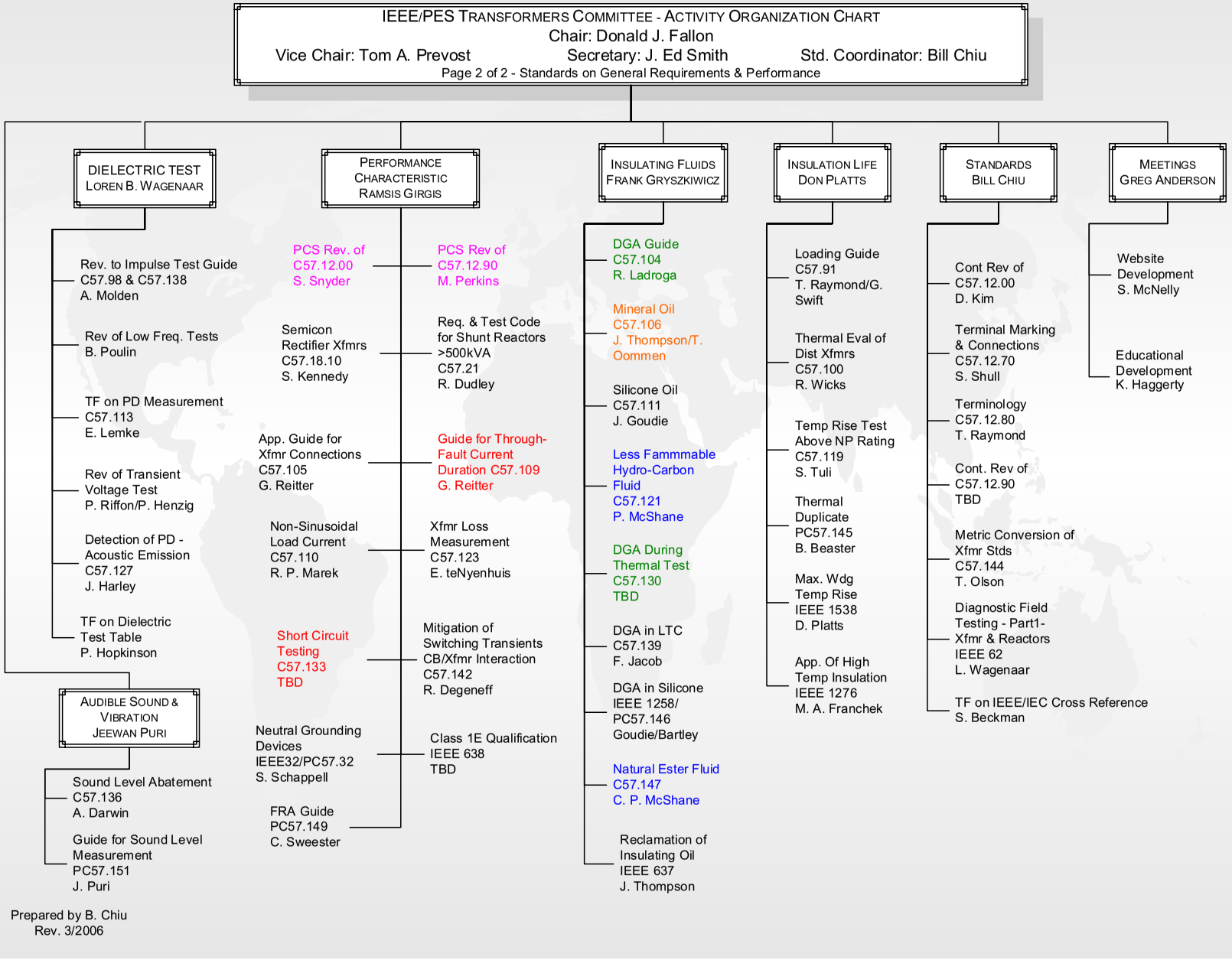

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