

IEEE/PES
Transformers
Committee

Meeting Minutes
March 11, 2004

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

March 11, 2004

San Diego, California, USA

***Minutes and Information Available on the
Committee Website:***

www.transformerscommittee.org

IEEE/PES TRANSFORMERS COMMITTEE MEETING

San Diego, California USA

March 9-11, 2004

ATTENDANCE SUMMARY

MEMBERS ATTENDING, AND PRESENT FOR MAIN MEETING (3/11)

Aho, David	Dix, Larry	Khalin, Vladimir	Prevost, Tom
Allan, Dennis	Dudley, Richard	Lackey, John	Progar, John
Anderson, Greg	Elliott, Fred	Lewis, Tim	Raymond, Charlie
Antosz, Stephen	Fallon, Don	Lundquist, Tom	Raymond, Tim
Ares Ignacio	Foldi, Joe	Marek, Rick	Ramono, Ken
Arnold, Jr., Jim	Fyvie, Jim	Marlow, Dennis	Schweiger, Ewald
Arteaga, Javier	Gardner, James	Matthews, John	Sharma, Devki
Ayers, Don	Ghafourian, Ali	McNelly, Susan	Shertukde, Hemchandra
Balma, Peter	Girgis, Ramsis	McShane, Patrick	Shull, Stephen
Barker, Ron	Gruber, Myron	Miller, Kent	Sim, Jin
Bartley, Bill	Gurnert, Robert	Mitelman, Mike	Smith, Ed
Boettger, Bill	Haas, Michael	Molden, Arthur	Snyder, Steven
Borst, John	Hager, Jr., Red	Morehart, Gene	Stahara, Ron
Callsen, Thomas	Haggerty, N. Kent	Mulkey, Daniel	Stiegemeier, Craig
Cash, Don	Hanique, Ernst	Nicholas, Ray	Sullivan, John
Chiu, Bill	Hanus, Ken	Niemann, Carl	Thompson, James
Colopy, Craig	Hayes, Roger	Olson, Tim	Thompson, Robert
Cooper, Tommy	Henning, Bill	Orehek, Paul	Tuli, Subhash
Corkran, Jerry	Hochanh, Thang	Patton, Jesse	Wagenaar, Loren
Crouse, John	Hopkinson, Phil	Payne, Paulette	Ward, Barry
D'Amico, Frank	Iman, Mike	Plaster, Leon	Watson, Joe
Darovny, Bill	James, Rowland	Platts, Don	Wilks, Alan
Darwin, Alan	Juhlin, Lars-Erik	Poulin, Bertrand	Zhao, Peter
Daubert, Ron	Kennedy, Sheldon	Preininger, Gustav	

GUESTS ATTENDING, AND PRESENT FOR MAIN MEETING (3/11)

Allen, Jerry	Fortin, Marcel	McKinney, Kenneth	Steineman, Andy
Andersson, Sten	Foster, Derek	Mclaren, Ronald	Subramanian, Raman
Arpino, Carlo	Fridman, Harry	Mitchell, Allen	Swinderman, Craid
Bassett, Tom	Ganser, Robert	Moffat, Jock	Taylor, Robyn
Baumgartner, Christopher	Garcia, Ramon	Navarro, Martin	Teetsel, Mark
Beckman, Stephen	Garnitschnig, Andreas	Nguyen, Vuong	Tillman, Robert
Bello, Oscar	Garza, Joseph	Nicholas, Ron	Traut, Al
Betancourt, Enrique	Graham, John	Oommen, T.V.	Verdolin, Roger
Bikash, Basy	Hammers, Jack	Peterson, Alan	Von Gemmingen, Rich
Blew, David	Harris, Earl	Rave, Martin	Von Staden, Otto
Boman, Paul	Heinzig, Peter	Rega, Chris	Wagner, Dieter
Britton, Jeffery	Holsomback, Steve	Rensi, Randy	Wallach, David
Bush, Carl	Huff, Tim	Roussell, Marnie	Walls, Albert
Castellanos, Juan	Jacobson, Clark	Russell, Donald	Weekes, Tony
Cheatham, Mark	Jaroszewski, Marion	Sandhu, Surinder	Williams, Michael
Cherry, Donald	Jauch, Tom	Schappell, Steven	Wiseman, James
Choinski, Scott	Johnson, Wayne	Schneider, Jeff	Yule, Kipp
Crotty III, John	Kalra, C.J.	Schroeder, Stephen	
Darby, John	Klaponski, Brian	Shah, Dilip	
Drexler, Charles	Kulasek, Krzysztof	Simpson, Jr., Bill	
Eckholz, Klaus	Lemke, Eberhard	Sotnick, Lewis	
Fairris, Bruce	Leuenberger, Boyd	Speegie, Andy	
Fausch, Reto	McKenny, Peter	Spitzer, Tommy	

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IEEE TRANSFORMERS COMMITTEE MEETING

Thursday, March 11, 2004

Chair: K. S. Hanus Vice Chair: D. J. Fallon

Secretary: T.A. Prevost

1.0 Chair's Report, Remarks & Announcements – K.S. Hanus

Chairman Ken Hanus called the meeting to order at 8:00 A.M. As there were no changes requested, the Agenda as published was generally followed.

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

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

- **Technical Editor**

The transformers committee would like to express its appreciation to Mark Christini for his efforts as our technical editor. Mark did an outstanding job in this position. We would like to introduce Steve Antosz who has accepted the position as technical editor.

Mr. Hanus also issued a request for people to assist our committee by reviewing papers. If anyone is interested please contact Steve Antosz or any committee officer.

- **New Transformer Committee Members**

Chairman Hanus introduced the following new members of the Transformer Committee:

Marcos Ferreira, Bonneville Power Administration - USER

Thang Hochanh, Hydro Quebec – USER

Scott Reed – Environmental Protection Svc – PRODUCER

Bill Darovny – VA TECH Ferantti Packard Transformers – Producer

Myron Gruber – Pauwels Transformors – Producer

Frank D'Amico – TAMINI Transformers – Producer

Roy Colquitt, Jr. – Georgia Power Co. – USER

Ignacio Ares – Florida Power & Light – USER

Thomas Callsen – ComEd – USER

New Emeritus Member – Jerry Smith, retired from Mississippi Power

Members -		199
Classifications:	Producers -	99
	Users -	54
	General -	40
Life Members		2
Corresponding Members -		1
Emeritus Members -		24

- **Transformers Committee Meeting Format Change**

We will not change the length of the meeting. This will remain as is with a three and a half day schedule. At present the committee officers are evaluating suggestions made regarding the format of the main committee meeting. If we change anything it will be tried at the meeting after next (Fall 2005).

- **Member Information**

Eddy So – Had a stroke and heart attack, he is still in the hospital, going home on weekends and beginning to answer emails. He will do this till the end of March, after which he will continue therapy twice a week. Greg has card to sign.

Bill Saxon of Duke Power, who retired from Duke and activities of the committee due to health reasons died December 2003.

Herr Otmar Neisen, HSP Managing Director-Germany, has suddenly passed away, contact Florian Costa.

- **IEEE/IEC Dual Logo Agreement**

The administrative subcommittee approved the submittal of C57.135 to IEC for consideration as a IEEE/IEC dual logo document.

- **Approval of Minutes**

Motion was made to approve the minutes with the exception that the inclusion of a letter contained in the Insulating Fluids subcommittee which is under review. The Dielectric Test and Insulation Life Subcommittee have corrections which need to be included with the minutes as well. A motion was made and seconded to approve the minutes from the October9, 2003 Transformers Committee meeting. This was unanimously approved.

The full content of Ken Hanus’s Chair’s Report follows:

1.1 Report on the Technical Council Meeting

The first PES General meeting took place during July 13 – 17, 2003, in Toronto, Ontario. Don Fallon, Secretary of our Committee, attended representing the officers of the Transformers Committee.

Attendance for this General Meeting stood at 1340 at the time of the Technical Council Meeting.

Future PES Meetings

- 1.1.1** [2004 PES General Meeting](#)
6-10 June, Denver, Colorado USA
- 1.1.2** **2005 PES General Meeting**
12-16 June, San Francisco, CA, USA
- 1.1.3** [IEEE PES Power Systems Conference & Exposition](#)
10-13 October, 2004 New York, NY USA

An Invitation to Attend

The IEEE Power Engineering Society's 2004 Power Systems Conference and Exposition (PSCE'04) will be held at the Grand Hyatt Hotel in New York, New York from 10 - 13 October 2004. This inaugural power systems event will bring together practicing power systems engineers, operators, planners, policy makers, economists, academics, and others from around the world to address topics under the event theme "New Solutions for New Challenges".

Aim of This Event

This conference and exposition will provide a venue to share and discuss various issues and developments in the multifaceted field of electrical power systems. This event will kick off with a timely and valuable plenary session on the subject "Balancing the Needs of Competitive Markets with Confidentiality and System Security" and will look back and address the lessons learned in the year following the August 14, 2003 North American blackout. The conference will comprise an outstanding combination of technical sessions, panel sessions, and tutorials 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
- Educational Track: Understanding Power Systems

The Exposition - A Highlight of the Event

The exposition will showcase state-of-the-art software and hardware systems as well as consulting services for those involved in the power systems area. There will be times devoted

exclusively to the exhibits--with no parallel technical sessions scheduled--so attendees can focus on the displays and have a chance to speak directly with vendors on the latest technologies, systems, software, hardware, and services as well as give exhibitors the opportunity to interact with many potential customers.

Who Will Attend

Power systems engineers, operators, planners, policy makers, economists, academics, and others working in the areas of planning, operation, implementation, security, and related areas, will greatly benefit from the discussions during meeting sessions and exposition describing, highlighting, and demonstrating the most up-to-date systems technologies in the industry. Vendors providing software and hardware systems as well as consulting services can access a large number of leaders in fields utilizing their products and services by participating in the PSCE'04 exposition. Both the conference and exposition of this inaugural event are sure to make this a premier international power systems gathering.

Call for Papers

The IEEE Power Engineering Society's 2004 Power Systems Conference and Exposition will be held at the Grand Hyatt Hotel in New York, New York, from October 10th-13th 2004. This inaugural power systems engineering conference will bring together practicing power engineers and academics from around the world to address the topics under the theme **New Solutions for New Challenges**. This event will provide a venue to share and discuss various issues and developments in the field of electrical power systems engineering, focusing on the following tracks:

TRACK 1: Planning and Operation, covering topics such as:

- Generation system resource planning
- Transmission and distribution system planning
- Integrated resource and distributed resource planning
- Load forecasting
- Customer products and services
- Industry restructuring planning
- Transmission and distribution operations, security, and asset management
- Asset management

TRACK 2: Markets, Policies, and Economics, covering topics such as:

- Emerging methods for restructured systems

- Economics, market organization, cost structures, pricing, and information security
- Industry restructuring policy issues and market design
- Ancillary services
- Risk management
- Long-term adequacy
- Cost / benefit issues
- Financial settlement
- Merchant power

TRACK 3: Dynamic Performance of Power Systems, covering topics such as:

- Modeling for dynamic performance analysis
- Stability and control
- System dynamics measurements
- Reliability, uncertainty, and stochastic system applications
- Distribution system performance
- Modeling, performance and control with emerging technologies (e.g., FACTS, distributed generation, superconductivity)
- Dynamic security assessment

TRACK 4: Real-Time Applications, covering topics such as:

- On-line tools and Internet applications
- Energy automation and information
- Systems integration
- On-line monitoring and diagnostics
- Cyber security
- SCADA / EMS / DMS
- Substation and distribution automation
- Computational techniques and analytical methods for planning, operation, and control
- Computing applications and information processing
- Intelligent systems

- Industry applications

EDUCATIONAL TRACK: Understanding Power Systems, covering topics such as:

- Educational and training programs
- Innovative methods of presenting power system engineering concepts
- Visualization techniques
- Internet tools for better understanding of power systems

Manuscript Submission: Complete manuscripts prepared in accordance with the conference call for papers should be submitted electronically via the special web site that has been established for PSCE submissions. Access the site through the PES home page at www.ieee.org/power. Paper submissions are due by April 12, 2004. Please check the PES website and the PES Author's Kit for manuscript formatting and preparation instructions and more information about submissions as it become available. All submissions will be reviewed as conference-grade papers.

1.2 Power & Energy Magazine

Mel Olken encourages submissions by all Technical Committees and the content is at the discretion of our committee. Our input is due June 2004.

1.3 IEEE SA Standards Board

Joe Watson was recently appointed as a new member of the Standards Board and the REVCOM committee. The chair was also appointed as a member of NESCOM. Roland James is also a new REVCOM member. With these appointments the committee now will have representation on the Standards Board, NESCOM, REVCOM and the Board of Governors.

2.0 Approval of Minutes of March 11, 2004 – K.S. Hanus

The chair asked that a motion be made to approve the minutes with the exception that the inclusion of a letter contained in the Insulating Fluids subcommittee which is under review. The Dielectric Test and Insulation Life Subcommittee also have corrections which need to be included with the minutes as well. A motion was made and seconded to approve the minutes from the October 9, 2003 Transformers Committee meeting. This was unanimously approved.

3.0 Administrative Subcommittee – Ken Hanus

Chairman Ken Hanus covered the key points of the Administrative Subcommittee Meeting held on March 7, 2004. Full details of the Minutes of the Administrative Subcommittee Meeting Minutes follow.

3.1 Introduction of members and guests

Chairman Hanus called the meeting to order at 2:00 p.m., Sunday, March 7, 2004, in the Toucan Room at the Catamaran Resort Hotel on Mission Bay in San Diego, USA. The meeting started with introductions of members and guests.

The following members of the Subcommittee were present:

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

The following members were absent:

C.W. Johnson	J. Puri
J.E. (Jim) Smith	

The following guests were present:

Earl Harris	Peter Balma
Stephen Shull	Dan Mulkey (rep. C.W. Johnson)

3.2 Approval of the Pittsburgh AdCom meeting minutes

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

3.3 Additions to and/or approval of the agenda

As there were no changes proposed, the Agenda provided by the Chair prior to the meeting was generally followed.

3.4 IEEE Staff Christine Santos (Mgr. Balloting Center)

- Christine joined us at the administrative subcommittee meeting to represent IEEE staff and to assist with questioning regarding balloting. She will be present for most of the meeting. She will give a presentation at the Monday luncheon meeting regarding balloting and publishing of standards.
- Richard Dudley asked about getting word documents for revising standards. Christine replied that at this time there is not a clean conversion process from the IEEE document to a word document. She will bring back the message that this is a priority for our standards developers.

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

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

- Financial – Committee funds are presently \$10,982.69 (as of February 9, 2004). Greg thanked the Meeting Hosts for working hard to control expenses and help with stewardship of the Committee's funds.
- San Diego Registration- Earl Harris was introduced. It was noted that Earl (who never attended a Committee meeting!) took on a big task when Ron Kirker left SDG&E in December. Greg also explained that during the registration process for this meeting photos were being taken of everyone that registers. These will be added to the web page with only the name attached. This will be viewable only on the secure site.
- Greg discussed the situation of virus filtering done by IEEE when alias's are used. IEEE is working to reduce the amount of emails stating that a virus has been found.
- Greg discussed the investigation of the purchase of a software package for membership lists and meeting registration. This will be a relational database that could have extended capabilities. The projected cost for this will be "a couple of hundred dollars/month". Greg will continue to explore and inform the administrative subcommittee.
- Future Meetings (see full details in Meetings Planning minutes)
 - Fall 2004 – The meeting in Edinburgh, Scotland has been canceled. The only hope for a fall venue is in Las Vegas. Greg stated that he would know this week if we could announce a Fall location in Las Vegas.
 - Spring 2005 – Will be in Jackson, Mississippi with Kuhlman Electric Corporation hosting.

3.6 Committee Service Awards – H.J. Sim

Jin indicated that he has two awards to be given at this meeting. He encouraged all members to identify retired working group chairs for awards. He also encouraged that members identify committee members deserving awards.

3.7 Chair's report – K.S. Hanus

Ken presented his report which is included in the main committee minutes. Ken also noted that the transformers committee now has two members who serve on the standards board committees: Joe Watson is a member of RevCom and the Standards Board and Ken Hanus is a member of NesCom. Tom Prevost also is a member at large on the Board of Governors.

3.8 Vice Chair's report – D.J. Fallon

- Don presented his report which is included in the main committee minutes. Don noted that we will be hosting two paper sessions at the PES General meeting in Denver. He noted that there are some interesting papers and that details are given in his report.
- Power and Energy magazine would like an article from the transformers committee for June publication. Don asked for suggestions for a topic.
 - Jin Sim suggested that we do an article on current committee activities. Particularly in regard to equipment condition assessment.
 - Ramsis Girgis suggested that we pick a prize paper for submission.

3.9 Secretary's Report – T.A. Prevost

The Secretary's Report was submitted prior to the meeting, and is included in the main committee minutes.

- 67 Printed copies of the minutes were mailed following the last meeting at a cost of approximately \$700. This is in contrast to ~ \$4000 when we mailed minutes to all members.

3.9.1 Membership review. Nine membership applications were submitted, reviewed and approved. These are:

- Thanng Hochanh - Hydro Quebec
- Scott Reed – Environmental Protection Agency
- Bill Darovny – VA Tech Ferranti-Packard
- Myron Gruber – Pauwels Transformers

- Frank D'Amico – Tamini Transformer
- Roy Colquitt Jr. – Georgia Power Co.
- Ignacio Ares – Florida Power & Light
- Thomas P. Callsen – Com Ed
- Marcos D. Ferreira – Bonneville Power Administration
- Jerry Smith, Mississippi Power was approved for a change in status to Emeritus Member.
- It was decided that someone can be a corresponding member of the transformers committee if they meet the criteria set forth in the O&P manual by participation through correspondence (attendance not required). This should be explained to the main committee at the Thursday meeting.

3.10 Standards Subcommittee – B. Chiu

3.10.1 Standards and coordination activities

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

- Bill asked members to critique the report itself and provide comments as to the report itself.
- Subcommittee chairs need to review the list of NEMA standards which IEEE has taken from NEMA. Please let Bill know whether these should be withdrawn or revised.
- The administrative subcommittee agreed that the responsibility for C57.12.23 should be moved from the Distribution subcommittee to the Underground Transformers and Network Protectors Subcommittee.

3.10.2 Documents submitted to the Standards Board

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

3.11 Round-Table: Subcommittee Activities - Subcommittee Chairs

3.11.1 Distribution Transformers – Ron Stahara, for Ed Smith

Dudley Galloway is resigning as chair of the metrification guide. Tom Olsen is co-chair and will be looking for help.

3.11.2 Bushings - F. E. Elliott

Nothing to report.

3.11.3 HVDC Converter Transformers & Smoothing Reactors - Richard Dudley

- There was discussion about whether we should reaffirm or revise C57.129 the converter transformer standard. It was decided to apply for a PAR for revision.

3.11.4 Dry-Type Transformers – Chuck Johnson

Nothing to report.

3.11.5 Instrument Transformers - J. E. Smith

Nothing to report.

3.11.6 Performance Characteristics – R. S. Girgis

- A task force has been formed to investigate Core Overexcitation
- There will a tutorial at this meeting addressing a test to determine Zero-Sequence Impedence. A task force will be formed to address this as well.

3.11.7 Meetings & Planning - Greg Anderson

No report.

3.11.8 Dielectric Tests - L. B. Wagenaar

Revision of C57.138 and C57.98 which both address impulse testing (C57.138 Distribution and C57.98 Power) will be worked on simultaneously in the same working group meeting.

3.11.9 Audible Sound and Vibration – Jeewan Puri

No report.

3.11.10 Underground Transformers and Network Protectors – C. Niemann

Nothing to report.

3.11.11 Insulating Fluids – F. J. Gryzkiewicz

The Transformers Committee has received a letter of concern related to the attachment letter included with the last Insulating Fluids Subcommittee Meeting in Pittsburgh, Pennsylvania. The Committee Officers will review this concern with IEEE as a follow-up to its initial review with

IEEE when this letter was presented for inclusion in the Minutes. Upon completion of that review, a decision will be made as to any changes and notifications needed related to the Minutes.

3.11.12 Insulation Life – D. W. Platts

Nothing to report.

3.11.13 Power Transformers - E.G. Hager

C57.21 going to Revcom.

3.12 Old Business

3.12.1 Recognition of “Superior Participation” & review of existing awards – H.J. Sim

There was discussion as to how we can award key contributors to the development of a document. At this time the WG chair will receive a plaque. Can other outstanding contributors get a plaque as well? Jin will check with IEEE.

Jin will compile a list of awards available from IEEE and distribute to Subcommittee chairs.

3.12.2 Submittal of C57.135 to IEC for consideration as an IEC-IEEE Dual Logo Document

This was approved by the Administrative Subcommittee.

3.12.3 Format of Thursday Main Committee Meeting

We do not plan to shorten the meeting from the present four day format. There have been many comments and suggestions made in regards to changes to the Thursday main committee meeting. The officers will review and evaluate these suggestions and make appropriate changes to the meeting. This will be done for a couple of meetings and then be further evaluated.

Ramsis further commented that Task Forces should hold meetings between the transformers committee meetings. Steve Shull suggested that this could be done using web meetings as well. Greg Anderson stated that Wes Patterson will do a tutorial at the fall meeting on web meetings.

3.13 New Business

3.13.1 Recognition of New Members – P. Balma

Peter suggested that the transformers committee should send a letter of recognition to the manager of a new member. He also suggested that a certificate be sent to the new member. Peter offered to draft a certificate and bring it to the next meeting. Don Fallon has drafted a letter for a

member who has changed employers encouraging continued membership. Jin Sim suggested that we should make sure that the member is in agreement with the letter being sent to his manager.

It was agreed that in the next revision of the O&P manual that the membership application form should be changed to include the manager's name and address as well as a check box to be marked if it OK to send a letter to this manager.

3.13.2 Neutral Ground Connection – D. Platts

.Don Platts will work with Jin Sim and Tom Prevost regarding suggestions for grounding transformers.

3.13.3 Stabilized Standards – B. Chiu

Standardized standards status has been approved at the last standards board meeting. Bill Chiu will give a report on stabilized standards at the next Administrative Subcommittee meeting.

3.13.4 Coordination of Oil Characteristics – F. Gryzkiewicz

Need to coordinate the oil values for IEEE 62, C57.104 and C57.106. All standards are in the revision process. The advantage is that now IEEE 62 falls under the transformers committee jurisdiction.

3.13.5 Eddy So

Greg Anderson informed the group that Eddy So recently suffered some medical problems. He encouraged members to e-mail Eddy to give regards. Also a card will be circulated during the meeting.

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

3.14 Adjournment

Chairman Hanus adjourned the meeting at 4:50 p.m.

IEEE/PES Transformers Committee Meeting Locations

<u>Year</u>	<u>Spring</u>	<u>Fall</u>	<u>Committee Chair</u>
2004	San Diego, CA	Las Vegas, NV	Hanus
2003	Raleigh, NC	Pittsburgh, PA	Sim
2002	Vancouver, BC, Canada	Oklahoma City, OK	Sim
2001	Amsterdam, The Netherlands	Orlando, FL	Patel
2000	Nashville, TN	Niagara Falls, ON, Canada	Patel
1999	New Orleans, LA	Monterey, Mexico	Matthews
1998	Little Rock, AR	Guanajuato, Mexico	Matthews
1997	Graz, Austria (summer)	St. Louis, MO	Binder
1996	San Francisco, CA	Burlington, VT	Binder
1995	Kansas City, MO	Boston, MA	Harlow
1994	Dallas, TX	Milwaukee, WI	Harlow
1993	Portland, OR	St. Petersburg, FL	Borst
1992	Birmingham, AL	Cleveland, OH	Borst
1991	Phoenix, AZ	Baltimore, MD	Veitch
1990	Denver, CO	Montreal, PQ, Canada	Veitch
1989	Chicago, IL	Charlotte, NC	Veitch
1988	Washington, DC	Long Beach, CA	Compton
1987	Ft. Lauderdale, FL	New Orleans, LA	Compton
1986	Little Rock, AR	Pittsburgh, PA	Yannucci
1985	St. Louis, MO	Toronto, ON, Canada	Yannucci
1984	Vancouver, BC, Canada	Boston, MA	Savio
1983	Atlanta, GA	Detroit, MI	Savio
1982	Los Angeles, CA	Philadelphia, PA	McNutt
1981	Portland, OR	Phoenix, AZ	McNutt
1980	Williamsburg, VA	Milwaukee, WI	Bonucchi
1979	San Diego, CA	Houston, TX	Bonucchi
1978	Miami, FL	Chattanooga, TN	Bennon
1977	Charlotte, NC	Montreal, PQ, Canada	Bennon
1976	New Orleans, LA	San Francisco, CA	Honey

4.0 Vice Chair's Report – D.J. Fallon

The following items report on activities of PES Committees on which the Vice Chair serves as Committee representative. There has been no general meeting since our Pittsburgh Fall 2003 meeting but the Technical Committee Program Chairs (TCPC's) met in Chicago on January 26, 2004 to plan and schedule the technical program for the general meeting in Denver this summer.

4.1 PES General Meeting in Denver - Technical Session Tracks

The IEEE Power Engineering Society (PES) 2004 General Meeting will be held at the Adam's Mark Hotel in Denver CO from June 6-10th, 2004. This power engineering conference will bring together practicing power engineering engineers and academics from around the world. The aim of the conference is to provide, share, and discuss various issues and developments in the field of electrical power engineering.

The theme of the meeting is "Is It Easy Being Green?" The tracks for the technical sessions are as follows:

TRACK 1: Active Load Participation and Its Impact on Markets

Conservation and Efficiency Measures—Including land reduction/control to avert less environmentally friendly generation

Energy Efficient T&D Systems — T&D companies have a vested interest in lowering their own usage of electricity; manufacturers are offering energy efficient equipment, IT

Substation Technologies to Improve System Efficiency — includes FACTS, automation, IT, advanced monitoring and control, voltage control, etc.

TRACK 2: Environmental Dimensions

Improved Environmental Impact of Existing Assets-can include technologies used for aesthetic improvements, noise mitigation, spill control/prevention, land remediation, waste management, EMF, community acceptance, etc.

Innovative generation and transmission controls and analysis techniques for improved power system dynamic performance and efficiency

The Role of Distributed Generation on Reducing the Environmental Impact

End of Life Issues for Electrical Equipment – death after life topic

Role of the Power System Engineer –

Substation Design for Environmental Acceptance

EMC and Its Applications in Communications

Environment Friendly Cable

EPD, Environmental Product Declarations

ISO 14000 – It's Impact on Design and Construction of Power Facilities

Regulatory Initiatives and International Issues

Role of Renewable Energy Sources

TRACK 3: Integration of Dispersed Generation

Hydropower – the original renewable and green power source

Penetration of Dispersed Technologies in the Power System – Internal/external security, reliability, power

Dispersed Generation and Interconnection

TRACK 4: Sustainability and Global Climate Change

Developing a Sustainable Energy and Power System

Policy Formulation and Incentives

Sustainable Energy Development and Supply - Continuing Education and Curricular Changes

Impact of Megagrids

4.2 Technical Paper Sessions

4.2.1 Technical Paper Session at the 2004 General Meeting

Two technical sessions sponsored by the Transformers Committee are planned with 2 Proceedings papers and 6 Transactions papers to be presented during the IEEE/PES 2004 General Meeting in Denver. The sessions are presently scheduled as follows:

Transformers I - Loss Performance and Thermal Evaluation

Wednesday, 9 June 9:00 AM-12:00 PM - (aligned to Track 1 - Active Load Participation and Its Impact on Markets {subtrack Energy Efficient T&D Systems})

“The Measurement and Evaluation of Distribution Transformer Losses Under Non-Linear Loading” by Damnjanovic and Ferguson

“Improved Insert Geometry for Reducing Tank Wall Losses in Pad-Mounted Transformers” by Olivares, Escarela-Perez, Kulkarni, de Leon, Melgoza and Hernandez

“Dynamic Thermal Modeling of Power Transformers” by Susa, Lehtonen and Nordman

“Power Transformer Temperature Evaluation for Overloading Conditions” by Jardini, Brittes, Magrini, Bini and Yasuoka

Transformers II - Modeling, System Interaction, and Diagnostics

Wednesday, 9 June 2:00 PM-5:00 PM - (aligned to Track 2 - Environmental Dimensions {subtrack Innovative generation and transmission controls and analysis techniques for improved power system dynamic performance and efficiency})

“Frequency Dependent Modeling of Power Transformers with Ungrounded Windings” by Gustavsen

“Wide Band Modeling of Power Transformers” by Gustavsen

“Development of a DC Current-Blocking Device for Transformer Neutrals” by Bolduc, Granger, Pare, Saintonge and Brophy

“An Attempt to Correlate Time and Frequency Domain Polarisation Measurements for the Insulation Diagnosis of Power Transformers” by Saha, Purkait and Muller

4.2.2 Technical Paper Session(s) at the 2005 General Meeting

Planning is underway for the technical program for the 2005 General Meeting in San Francisco (June 12-16, 2005). When available, suggested themes and topics will be posted on the PES website, http://www.ieee.org/portal/index.jsp?pageID=pes_home. This site is also accessible through our website. Paper submission can be expected to open in October.

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 is scheduled to contribute an article to Power & Energy magazine for publication in June 2004. The format and content is at the discretion of the Committee. The deadline for submission is probably fast approaching, and our scheduled submission is not yet planned. Information of submittals can be found on the PES website. The Vice Chair will be looking for submittal ideas at the Administrative SC meeting.

Respectfully submitted, D. J. Fallon, Vice Chair

5.0 Transformer Standards – Bill Chiu

5.1 Meeting Attendance

The Standards Subcommittee met Wednesday, March 10, 2004 at 4:30 PM with 13 members and 17 guests present.

5.2 Report of the Working Group

5.2.1 C57.12.00 and C57.12.90 - Subhash Tuli, WG Chair

The ballot at the end of 2002 received many comments and negatives on metrification
Will submit for re-circulation ballot this fall with revised draft

5.2.2 PC 57.144 - Guide for Metrification of Transformer Standards – Tim Olson, WG Chair

Tim Olson has taken on the responsibility of the Working Group Chair
Currently working on Draft 5.

5.2.3 IEEE 62 - Wally Binder, WG Chair

Currently working on reaffirmation of the standards.

5.2.4 C57.12.80 Terminology for Power and Distribution Transformers WG Chair - Tim Raymond

Had first working group meeting.

Looking for representative volunteer from each of the subcommittees to work on the revisions.

5.3. Old Business

5.3.1 Matrix of responsibility for C57.12.00 and C57.12.90

Members have expressed a need for a quick guide on responsible subcommittee for the various sections of C57.12.00 and C57.12.90

Will be looking for a volunteer to compile a listing for review.

5.3.2 NEMA Standards

The Transformers Committee has taken on the responsibility of the following NEMA standards

C57.12.10-1997	C57.12.26-1992	C57.12.50-1981
C57.12.20-1997	C57.12.28-1999	C57.12.51-1998
C57.12.21-2002	C57.12.29-1991	C57.12.52-1981
C57.12.22-1993	C57.12.31-2002	C57.12.55-1987
C57.12.24-2000	C57.12.32-2002	C57.12.57-1987
C57.12.25-1990	C57.12.40-2000	

- These standards will follow the IEEE guideline of 5-year revision cycle – starting in December 2002.
- Word document on existing standards to facilitate revision is not readily available
- B. Chiu will take on the action item of checking with IEEE or NEMA representative for these standards in Word format. Will report at next meeting.

5.4 New Business

5.4.1 IEEE and IEC Standards coordination/harmonization

Members requested a cross-reference guide between IEEE and IEC Standards in order to facilitate coordination and harmonization.

- Mr. Poulin indicated the IEC group may have such a cross reference list
- B. Chiu will take on this action item and contact Phil Hopkinson to obtain this list.

5.5 Standards Activities Since the October, 2003 Meeting

DATE: March 7, 2004
TO: Members of IEEE Transformers Committee
FROM: Bill Chiu, Standards Subcommittee Chair IEEE /PES Transformers Committee
SUBJECT: Standards Activities since the October, 2003 Meeting

TRANSFORMERS STANDARDS STATUS

The transformers standards status is given with one attachment entitled IEEE/PES Transformers Committee Status Report of Standards, Dated 3/6/2004.

The report is a list of all the C57 standards, including ANSI C57 standards, sorted by Subcommittee names. It contains a listing of the projects for which a Subcommittee is responsible. The standards that are not assigned to a subcommittee yet are temporarily listed under the Standards Subcommittee.

NEMA/ANSI DOCUMENTS TRANSFERRED TO IEEE

The following standards were transferred to IEEE as of December 2, 2002. Currently there is no process for reaffirmation for these standards as these were not prepared under IEEE. The date of transfer (December 2, 2002) will be considered as the start of life. These standards will need a PAR for revision. We will have 5 years from the date of transfer to revise these standards. Given that these are special circumstances, it is likely we could obtain some extension from RevCom.

At this point IEEE SA indicated they can only provide PDF document for our revision work.

[C57.12.10-1997](#)

[C57.12.20-1997](#)

[C57.12.21-2002](#)

[C57.12.22-1993](#)

[C57.12.24-2000](#)

[C57.12.25-1990](#)

[C57.12.26-1992](#)

[C57.12.28-1999](#)

[C57.12.29-1991](#)

C57.12.31-2002

C57.12.32-2002

C57.12.40-2000

C57.12.50-1981

C57.12.51-1998

C57.12.52-1981

C57.12.55-1987

C57.12.57-1987

DOCUMENTS SUBMITTED TO THE IEEE STANDARDS BOARD

NEW STANDARDS COMMITTEE (NesCom)

Recommendations - 22 October 2003

PC37.91 (PE/PSR) Guide for Protecting Power Transformers

Recommendation: Approve PAR for the revision of a standard until December 2007.

Recommendations - 9 December 2003

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

Recommendation: Approve target extension request until December 2005.

PC57.130 (PE/TR) 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: Approve target extension request until December 2005 (8 approve, 0 disapprove, 1 abstain-Paul Nikolich).

PARS TO BE ADMINISTRATIVELY WITHDRAWN

PC57.141 (PE/TR) Guide for the Application of Load Tap Changers

Recommendation: Approve administrative withdrawal.

NEW PARS

PC57.147 (PE/TR) Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers
Recommendation: Approve new PAR until December 2007.

PARS FOR REVISIONS OF STANDARDS

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

Recommendation: Approve PAR for the revision of a standard until December 2007.

NEW STANDARDS COMMITTEE (NesCom)

Recommendations - 19 February 2004

NEW PARS

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

Recommendation: Approve new PAR until December 2008.

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

Recommendation: Approve new PAR until December 2008.

STANDARDS REVIEW COMMITTEE (RevCom)

RECOMMENDATION – 9 December, 2003

C57.13-1993 (PE/TR) IEEE Standard Requirements for Instrument Transformers

Recommendation: APPROVE

C57.18.10-1998 (PE/TR) IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers

Recommendation: APPROVE [Vote: Yes=9; No=0; Abstain=2 (Aggarwal, Klerer)]

C57.19.100-1995 (PE/TR) IEEE Guide for Application of Power Apparatus Bushings

Recommendation: APPROVE

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

Recommendation: APPROVE

STANDARDS REVIEW COMMITTEE (RevCom)

5-Year Review Cycle – December, 2003

62-1995 IEEE Guide for Diagnostic Field Testing of Electric Power Apparatus - Part 1: Oil Filled Power Transformers, Regulators, and Reactors

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2004.

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 2004.

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

Sponsor has submitted a PAR extension request to NesCom for revision project PC57.12.01.

Recommendation: Extend until the expiration of the PAR for PC57.12.01 {December 2005}.

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

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

Recommendation: Extend until December 2004.

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

Sponsor has submitted a PAR for revision to NesCom.

Recommendation: Extend until the expiration of the PAR for PC57.12.60 {December 2007}.

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

Sponsor has submitted a PAR for revision to NesCom.

Recommendation: Extend until the expiration of the PAR for PC57.12.60 {December 2007}.

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2004.

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2004.

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

Sponsor states that a reaffirmation ballot will be initiated shortly.

Recommendation: Extend until December 2004

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2004.

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

Sponsor states that a reaffirmation ballot is in progress.

Recommendation: Extend until December 2004.

PARS DUE TO EXPIRE AT THE END OF 2004

(from IEEE SA/J. Haas)

PC57.12.25 Standard for Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage, 34500 GrdY/19920 Volts and Below, Low Voltage, 240/120 Volts; 167 kVA and Smaller – Requirements

- PC57.12.33** Guide for Distribution Transformer Loss Evaluation
- PC57.12.34** Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 2500 kVA and Smaller: High-Voltage, 34 500GrdY/19 920 Volts and Below; Low Voltage, 480 Volts and Below
- PC57.15** Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators
- PC57.19.00** Standard General Requirements and Test Procedure for Power Apparatus Bushings
- PC57.104** Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers
- PC57.119** Recommended Practice for Performing Temperature Rise Tests on Oil Immersed Power Transformers at Loads Beyond Nameplate Rating
- PC57.142** A Guide To Describe The Occurrence And Mitigation Of Switching Transients Induced By Transformer-Breaker Interaction
- PC57.145** Guide for the Definition of Thermal Duplicate Liquid-Immersed Distribution, Power, and Regulating Transformers

If the projects will not be submitted to RevCom in time for the December 2004 meeting, you have the following options:

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

If there is no response by 19 October 2004, the projects will be recommended for administrative withdrawal at the 8 December 2004 IEEE-SA Standards Board meeting.

INVITAION TO BALLOT STATUS -- 2003-2004 , SORTED BY INVITATION NUMBER (As of 3/5/2004)

Invitation Number	Sponsor (Soc/Com)	Working Group Chair	Invitation Open Date	Invitation Close Date	Invitations Sent Out	Type of Invitation
PC57.12.20	PE/TR	Alan Wilks	2/3/2004	3/4/2004	673	Electronic Invitation
PC57.12.37	PE/TR	Richard Hollingsworth	11/13/2003	12/13/2003	658	Electronic Invitation
PC57.13.2	PE/TR	Vladimir Khalin	10/17/2003	11/16/2003	658	Electronic Invitation
PC57.13.6	PE/TR	Chris Ten-Haagen	9/12/2003	10/12/2003	653	Electronic Invitation
PC57.130	PE/TR	Frank J Gryszkiewicz	9/8/2003	10/8/2003	653	Electronic Invitation
PC57.144	PE/TR	Dudley L Galloway	7/7/2003	8/6/2003	651	Electronic Invitation
PC57.146	PE/TR	William H Bartley	2/19/2004	3/20/2004	675	Electronic Invitation
Std.259 REAFF	PE/TR	Robert Simpson	11/7/2003	12/7/2003	664	Electronic Invitation
Std.C57.110 REAFF	PE/TR	Richard P Marek	1/23/2003	2/22/2003	844	Electronic Invitation
Std.C57.111 REAFF	PE/TR	N Kent Haggerty	3/31/2003	4/30/2003	642	Electronic Invitation
Std.C57.117 REAFF	PE/TR	Wallace B Binder	9/12/2003	10/12/2003	653	Electronic Invitation
Std.C57.121 REAFF	PE/TR	Charles McShane Patrick	10/23/2003	11/22/2003	658	Electronic Invitation

Std.C57.125 REAFF	PE/TR	Wallace B Binder	9/12/2003	10/12/2003	653	Electronic Invitation
Std.C57.13 REAFF	PE/TR	James Smith	4/1/2003	5/1/2003	642	Electronic Invitation
Std.C57.138 REAFF	PE/TR	John R Rossetti	9/4/2003	10/4/2003	653	Electronic Invitation
Std.C57.18.10 REAFF	PE/TR	Sheldon P Kennedy	6/5/2003	7/5/2003	650	Electronic Invitation
Std.C57.91 REAFF	PE/TR	Timothy Raymond	7/15/2003	8/14/2003	651	Electronic Invitation
Std.C57.96 REAFF	PE/TR	Michael E Haas	11/21/2003	12/21/2003	663	Electronic Invitation

BALLOT STATUS - 2003-2004, SORTED BY BALLOT NUMBER (As of 3/5/2004)

Ballot Number	Sponsor (Soc/Com)	Type of Ballot	Ballot Opened	Sched. Close Date	# Ballots	Balloting Results			Type of Ballot
						Affirm	Neg	Abstain	
PC 57.13.6/D1	PE/TR	New	20-Nov-03	20-Dec-03	82	95%	5%	5%	Electronic
PC57.12.34/D10	PE/TR	Reballot	3-Feb-04	4-Mar-04	90				Electronic
PC57.12.34/D9	PE/TR	Recirc	7-Feb-03	9-Mar-03	90	79%	21%	3%	Electronic
PC57.144/D4	PE/TR	New	11-Nov-03	11-Dec-03	120	98%	2%	3%	Electronic
Std. 259-1999	PE/TR	Reaff	12-Dec-03	11-Jan-04	56	100%	0%	2%	Electronic
Std. 62-1995	PE/TR	Reaff	17-Mar-03	16-Apr-03	122	95%	5%	3%	Electronic
Std. 62-1995	PE/TR	Reaff Recirc	26-Sep-03	26-Oct-03	122	99%	1%	3%	Electronic
Std. C57.110-1998	PE/TR	Reaff	27-Feb-03	30-Mar-03	132	99%	1%	1%	Electronic
Std. (R1995)	PE/TR	Reaff	9-May-03	8-Jun-03	73	100%	0%	0%	Electronic
Std. C57.117-1986	PE/TR	Reaff	16-Oct-03	15-Nov-03	98	100%	0%	3%	Electronic
Std. C57.121-1998	PE/TR	Reaff	21-Jan-04	20-Feb-04	73	100%	0%	1%	Electronic
Std. C57.125-1991	PE/TR	Reaff	16-Oct-03	15-Nov-03	137	99%	1%	4%	Electronic
Std. C57.13-1993	PE/TR	Reaff	9-May-03	8-Jun-03	92	94%	6%	5%	Electronic
Std. C57.13-1993	PE/TR	Reaff Recirc	5-Aug-03	4-Sep-03	92	98%	2%	3%	Electronic
Std. C57.138-1998	PE/TR	Reaff	10-Oct-03	9-Nov-03	83	100%	0%	1%	Electronic

Std. C57.18.10-1998	PE/TR	Reaff	10-Jul-03	9-Aug-03	52	95%	5%	2%	Electronic
Std. C57.21-1990	PE/TR	Reaff Recirc	12-Sep-03	27-Oct-03	78	93%	7%	3%	Paper
Std. C57.91-1995	PE/TR	Reaff	11-Sep-03	11-Oct-03	155	98%	2%	3%	Electronic
Std. C57.96-1999	PE/TR	Reaff	5-Jan-04	4-Feb-04	70	100%	0%	1%	Electronic

2004 STANDARDS BOARD MEETINGS SCHEDULE AND SUBMITTAL DEADLINES

2004

IEEE Standards Association Meeting Schedule

Jan 2004

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 2004

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29						

Mar 2004

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Apr 2004

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May 2004

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Jun 2004

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- February**
- 13 Draft and PAR Submission Deadline
 - 15 BoD/ExCom - Savannah, GA
 - 25 SA-BoG Caucus - Piscataway, NJ
 - 26 SA-BoG Meeting - Piscataway, NJ
 - 27 SA-BoG Meeting - Piscataway, NJ

- March**
- 23 StB Committee Mtgs - Piscataway, NJ
 - 24 StB Committee Mtgs - Piscataway, NJ
 - 25 StB Meeting - Piscataway, NJ

- May**
- 14 Draft and PAR Submission Deadline
- June**
- 20 BoD/ExCom - Kansas City MO

- 22 StB Committee Mtgs - Piscataway, NJ
- 23 StB Committee Mtgs - Piscataway, NJ
- 24 SA-BoG Caucus - New Brunswick, NJ
- StB Meeting - Piscataway, NJ
- 25 SA-BoG Meeting - Piscataway, NJ

- August**
- 13 Draft and PAR Submission Deadline
- September**
- 21 StB Committee Mtgs - Piscataway, NJ

- 22 StB Committee Mtgs - Piscataway, NJ
- 23 StB Meeting - Piscataway, NJ

- October**
- 19 Draft and PAR Submission Deadline

- November**
- 21 BoD/ExCom - San Antonio, TX
- December**
- 2 SA-BoG Caucus - NYC
 - 3 SA-BoG Meeting - NYC
 - 4 SA-BoG Meeting - NYC
 - 5 SA-BoG/StB Awards Ceremony - NYC
 - 6 StB Committee Mtgs - NYC
 - 7 StB Committee Mtgs - NYC
 - 8 Standards Board Mtg - NYC

Jul 2004

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Aug 2004

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Sep 2004

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Oct 2004

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Nov 2004

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Dec 2004

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24	25	26	27	28	29	30
31						

NesCom and RevCom meet on the second day of the Standards Board meetings

<u>Meeting Dates</u>	<u>Deadline for Submittal of PAR ⁽¹⁾ or Draft Standard ⁽²⁾</u>
March 23, 2004	February 13, 2004
June 22, 2004	May 14, 2004
September 21, 2004	August 13, 2004
December 6, 2004	October 19, 2004

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

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 WEB SITE MARCH 5, 2004)

<http://standards.ieee.org/board/nes/C2-C136.html>

Only PARs submitted electronically and approved since the December 1998 Standards Board meeting are listed

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

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

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

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

[PC57.12.25](#) (PE/TR) Standard for Pad-Mounted, Compartmental-Type, Self-Cooled, Single-Phase Distribution Transformers with Separable Insulated High-Voltage Connectors; High Voltage, 34500 GrdY/19920 Volts and Below, Low Voltage, 240/120 Volts; 167 kVA and Smaller - Requirements

[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

[PC57.12.33](#) (PE/TR) Guide for Distribution Transformer Loss Evaluation

[PC57.12.34](#) (PE/TR) Requirements for Pad-Mounted, Compartmental-Type, Self Cooled, Three-Phase Distribution Transformers, 2500 kVA and Smaller: High-Voltage, 34 500 GrdY/19 920 Volts and Below; Low Voltage, 480 Volts and Below

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

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

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

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

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

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

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

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

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

[PC57.13.2](#) (PE/TR) Conformance Test Procedure for Instrument Transformers

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

[PC57.13.6](#) (PE/TR) Standard for High Accuracy Instrument Transformers

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

[PC57.19.00](#) (PE/TR) General Requirements and Test Procedures for Power Apparatus Bushings

[PC57.19.03-1996/Cor 1-20xx](#) (PE/TR) Standard Requirements, Terminology, and Test Code for Bushings for DC Applications - Corrigendum 1

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

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

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

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

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

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

[PC57.119](#) (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

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

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

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

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

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

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

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

[PC57.145](#) (PE/TR) Guide for the Definition of Thermal Duplicate Liquid-Immersed Distribution, Power, and Regulating Transformers

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

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

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

6.0 Recognition and Awards – Chair: H. Jin Sim

6.1 Certificates of Appreciation

Certificates of Appreciation have been obtained for the following persons:

<u>Name</u>	<u>Service Rendered</u>
A. Earl Harris, P.E.	Host, Spring 2004 Meeting, San Diego, CA
Greg Anderson, P.E.	Certificate of Appreciation

6.2 Nominations for IEEE, PES, and Technical Council Awards

None at this time.

6.3 Awards – General

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

AWARD	NOMINATION DEADLINE	NOMINATION SENT TO
PES Prize Paper Award	***	Mohammad Shahidehpour
PES Working Group Award (Technical Report)	***	Mohammad Shahidehpour
PES Working Group Award (Standard or Guide)	***	Mohammad Shahidehpour
“High Interest” Paper	***	Noel Schulz
Alfred Nobel Intersociety Award	***	Noel Schulz
Charles Concordia Power System Engineering Award	January 1	Richard G. Farmer
Cyril G. Veinott Electromechanical Energy Conversion Award	February 2	Steve Pekarek

Electrotechnology Transfer Award	***	Sandra Kim
IEEE Herman Halperin Electric Transmission and Distribution Award	***	IEEE Awards Activities
IEEE Richard H. Kaufmann Award	***	IEEE Awards Activities
IEEE Charles Proteus Steinmetz Award	***	IEEE Awards Activities
IEEE Nikola Tesla Award	***	IEEE Awards Activities
Uno Lamm HVDC Award	***	Prof. Willis Long
Walter Fee Outstanding Young Engineer Award	February 15	Prof. Thomas J. Overbye
Technical Committee Prize Paper Award	***	Noel Schulz
Technical Committee Distinguished Service Award	***	Noel Schulz
Tech. Com. Working Group Recognition Award	***	Noel Schulz
IEEE Prize Paper Award (W.R.G. Baker)	April 1	Mohammad Shahidehpour
IEEE Prize Paper Award (Donald G. Fink)	April 1	Mohammad Shahidehpour
IEEE Prize Paper Award (Browder J. Thompson)	April 1	Mohammad Shahidehpour

*** Will be decided later. Most of these are annual awards and we can submit the nominations throughout the year.

7.0 Reports of Technical Subcommittees

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

Secretary's Note: The subcommittee reports have been edited in some cases for consistency in format. No changes have been made to the content of these reports except for typographical errors and removal of material (attendance lists and some general items, typically items from the Administrative Subcommittee Meeting, covered elsewhere) not required in these assembled Minutes. Complete (unedited) Subcommittee meeting minutes are individually posted on the Committee website (<http://www.transformerscommittee.org/>).

7.1 Insulation Life Subcommittee - D.W. Platts

Note: These minutes are still in preliminary form, and some working group reports are still missing. Please refer to the Transformers Committee website, [www.transformerscommittee.org](#), for the final version of these minutes

The Insulation Life Subcommittee met at 8:00 AM Wednesday, March 19, 2004 in San Diego, CA. Attendance was XX members and XX guests.

The minutes of the October 8, 2003, 2002 meeting in Pittsburgh were approved.

7.1.1 Chair's Report

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

Our next subcommittee meeting will be in Las Vegas on October 27, 2004.

7.1.2 Status Reports for active projects:

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

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

7.1.2.2 Subhash Tuli reported that ballots of C57.12.00 and C57.12.90 have been completed. They were successful, but there are several items to be resolved from the negatives and the comment. Some of them will be forwarded to our subcommittee for resolution.

7.1.3 Working Group Reports

7.1.3.1 Working Group on Loading of Liquid Immersed Transformer - Tim Raymond, Chair.
WG Meeting minutes

Meeting started at 1:50 PM, Tuesday, March 9, 2004.

There were 26 members present and 56 guests with 12 guests requesting membership to the WG.

Some work on Draft three has been done. A copy of Draft 3 is available on line for review. The draft is being edited to format per the IEEE style guide.

Presentation by Glenn Swift, "Comparison of Calculated Hot Spot Temperatures Using CLAUSE 7 Equations versus ANNEX G Equations."

Two methods of calculating *hot spot* temperatures in the current Guide are the Annex G method and the Clause 7 method. Which should be used?

Results from each model were compared for four different example transformers, covering each cooling type. For each case, three scenarios were studied: steady state, four-hour overload (1.4 PU), and typical daily load curve.

For ONAN, ONAF and OFAF, the results differ for short duration overloads, with the Annex G model rising more rapidly for ONAN and ONAF and more slowly for OFAF. The two models agree fairly well at steady state, with the exception of ODAF. For ODAF, the Annex G model gives significantly higher temperatures.

Conclusions: One source of error is that the *Clause 7* method ignores the effect of oil viscosity and winding resistance, both of which vary significantly with temperature.

The problem with using the Annex G method is that unless you have the bottom oil temperature information, you cannot use the Annex G method.

Comment: Don Platts indicated he would be more concerned with the maximum oil rise rather than the duct oil rise.

Modification of Clause 7 may make the results more correct; however, comparison to historical data may be lost as a result.

The equations that are there do not adequately cover ODAF designs. Therefore at a minimum, we need to discuss corrections to the calculations for those cases.

Will pursue making corrections for the ODAF type transformer model to present at the next meeting.

Comments from reaffirmation Ballot last fall:

- Overhead type transformer, knowledge of the bottom oil temperature requires that the heat run test is being made on a structure that make that air will freely circulate under the transformer. *Don't feel this is necessary*
- In section 7.2.5 there is no indication that the weight of the tank and fittings does not include those items whose temperature is not affected by the oil. It is noted in section 4.4 note j, but would a person working through the equations in section 7.2 remember that note? *Will make sure this is clarified.*
- Under paragraph on “possible bushing overload effects..... Suggested remedy was to add “Electrical failure can occur due to the rapid increase in partial discharges due to the increase in heat in the insulation.” *No resolution*
- The guide should be revised to include the real hot spot limits when tap changers are included. Suggested remedy: Revise to include the effect of tap changer position on hot spot temperatures per above comment. *No resolution*
- Most users specify that transformer must meet overloads per C57.91. Suggested remedy: At the beginning of this guide include a paragraph that this Guide gives methods of calculations and the user should include the specific overload profile required in their specification. *Will add note to user to inform them of this.*
- Annex D and E (Prenninger): Would prefer to put these at the beginning of the Guide to make sure they are used and users are aware of what the risks are. *The Guide should be almost tutorial like so that the user is aware of the risks.*
- Possible overloading of power transformers up to 2 times the rated current. The conditions of the core when the transformer is operated under high loads are not considered. Depending on the physical arrangement of the windings, the core could be heavily overexcited, stray flux pattern and eddy losses could be influenced. *This will need to be addressed.*
- In Chapter 7, a formula is given to evaluate the bubble evaluation temperature. Can you determine the moisture content with enough accuracy to reliably predict the onset of bubble formation? Do we set a temperature limit, skip different temperature limits for dry or moderately dry transformers, etc. Implication is that the formula implies an accuracy that is really not there.
- Recommendation to change the hottest spot winding temperature for planned overloads to 140C and in case of extreme emergency to 160C. Will discuss at another time.

Meeting adjourned at 3:00 PM.

Respectfully Submitted,

Tim Raymond

Working Group Chairman

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

The working group met on Tuesday, March 9, 2004 with eleven members and 23 guests attending. An agenda, a copy of the Fall 2003 meeting minutes, a proposal to address two concerns from the last meeting, and a proposed subcommittee survey were electronically distributed to the working group just prior to the meeting. Additional paper copies were available for guests. After introductions, the Fall 2003 meeting minutes were corrected with the change of the word 'pre-quality' to 'pre-qualify', and the omission of the acceptance of Sheldon Kennedy from Niagara Transformer as a new member. The minutes will be corrected and issued. A request for membership was received from Ron Daubert of Finley Engineering and is accepted into the working group.

The three topics addressed at this meeting will be stated here and highlights of the discussion will follow:

- 1) A proposed future survey question to the Insulation Life Subcommittee. Do we still have a need for a definition of a thermal duplicate transformer, and a guide to determine what qualifies as that duplicate?
- 2) In what manner shall this guide address hottest spot rise?
- 3) In what manner shall this guide consider using a tested 55/65°C rise transformer to calculate thermal characteristics on a new unit rated for 65°C rise?

Due to the large number of participants discussing each topic and the amount of points raised by different people, individual's names were not recorded accurately enough to permit inclusion into the minutes. Summary points will be numerated for each topic to illustrate the discussion.

- 1) Discussion on the questioned need for a thermal duplicate guide generated the following:
 - a) For companies doing dynamic loading, accurate and reliable thermal data is critical. It is important to have a guide to assure consistent results.
 - b) With the emphasis on accurate hottest spot calculations, a trend in thermal test results shows greater margins between guaranteed and tested rises. Possibly due to larger hottest spot rises than previously applied.
 - c) Since the hottest spot is generally the limiting factor, the use of manufacturers calculations should be sufficient to satisfy average winding rise and top oil rise for a range of designs. It would be the right of the user to challenge the manufacturer's models and calculations to ensure the results are proper.
 - d) An example of a change in a tap switch location where all other factors being held equal was used to illustrate the flaw in using the present guide.
 - e) In distribution transformer manufacture, design tests are made and have been shown to be useful for a range of new designs to be able to predict the rises will not exceed guaranteed values.
 - f) The determination of whether to use a thermal duplicate seems to be a risk assessment the user should make. The focus is whether the cost and time of making a thermal test is offset by how critical the transformer is in its installation.

At this point the discussion was concluded and a hand vote was held to gauge the proposed survey question. One voted to continue the project; six voted to continue but re-ballot based on the discussion; and eight voted stating there is no need for the guide. As a follow-up, an official survey of the working group membership roster will be made prior to a survey of the subcommittee.

- 2) With respect to the guide addressing hottest spot rise the following points were discussed.
- a) It was proposed prior to the meeting that an example hottest spot rise be included in the guide. It was generally felt that no example should be added as several methods are available and precedence might be indicated if just one method were presented.
 - b) A descriptive section may be appropriate to identify how critical the need is to have a reliable calculation for hottest spot.
 - c) It was further commented not to apply a uniform 'H factor' as this value may not only vary from design to design, but may also vary from winding to winding in the same transformer.

The meeting consensus stated the guide should include the importance of accurate hottest spot in determination of thermal duplicates, but will leave the specific determination in other standards.

- 3) With respect to how to address 55/65°C and 65°C rise transformers the following was discussed.
- a) The consensus of the meeting was it would be unlikely that enough thermal characteristics already included in the guide would be within range to consider comparing transformers with different temperature guarantees.
 - b) There may be other thermal characteristics not considered that make this comparison more difficult to accept.

The meeting consensus was to prohibit the use of 55/65°C transformers for the thermal basis for a 65°C transformer and include another thermal characteristic stating both the tested and proposed thermal duplicate transformer have the identical temperature rise guarantee.

As time had almost expired, it was suggested a greater tutorial section near the beginning of the guide might be needed to identify the focus of the guide. The focus has to consider more than just the ranges of the thermal characteristics included in the guide, as the consensus of this guide may still be a long way off.

Respectively submitted,

Barry L. Beaster

Chairman

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

The Working Group met at 9:30 AM on Monday, March 8, 2004, with 12 members and 31 guests attending, with 7 guests requesting membership. This brings the number of members for the working group up to 44 members.

After introductions, the Chairman presented the agenda for the meeting, and circulated the attendance rosters, and circulated the minutes from the October 6th meeting in Pittsburgh.

Following this, the Chairman provided background on the status of this document as well as the last couple of meetings. Much of the discussion revolved around proposed wording for the scope of the document. The scope will be used for submitting a PAR in the next couple of weeks.

The agreed upon Scope is as follows:

Scope - This standard provides test procedures to evaluate the thermal

aging characteristics of insulation systems used in liquid-immersed distribution or power transformers. The dielectric liquid is part of the insulation system. The test procedure shall simulate practical service conditions of the insulation system, with the main emphasis on the thermal aging of materials in the candidate insulation system as compared to a conventional insulation system.

The main differences between this Scope and prior attempts was to note that this document largely involves the testing of new (or candidate) insulation systems, as compared to “conventional” insulation systems. Once the group agreed that we could define the “conventional” insulation system in the body of the document rather than in the scope, the approval was quickly voted on and approved.

The chair solicited members of the working group, especially the equipment manufacturers to provide input to the chair as to their thoughts regarding “conventional” insulation systems, to be discussed at the next meeting. It is expected that the conventional system will be defined by the OEM’s based on the current materials in use, for which they life experience. It was noted that this could be a different combination for each OEM, based on their type of equipment and method of oil preservation.

This discussion also solicited comments that there is a difference between the two life curves in the document. It was noted that this is discussed in the annex of C57.91, but may also need to be taken into consideration when we look to revising this document. Issues regarding the end of life and the key aspects of the insulation (mechanical and electrical strengths) were brought up. Issues related to

inhibited oil, free breathing transformers, oxygen, moisture all affecting life were discussed. This only points out the variety of reasons for revising this document. A solicitation of papers in the bibliography was met with a copy of some of the papers in CD form from Tim Raymond (thanks to Tim). This will be useful in helping look at these many issues in the work going forward. Editor's note – in quickly looking at this disk, there is a lot of very useful information to the topics discussed above, and these papers will be of significant use to the Working Group.

The Task Force on Defining Thermal Upgraded Insulation chaired by Don Platts will deal with the issue of setting a requirement of insulation life into C57.12.00 for which this document will only be a test for compliance when changes are made. This will be discussed in the task force meeting on Tuesday (tomorrow).

The chair solicited volunteers to help with different sections of the document. The comments for sections pertaining to the distribution transformer aging will be compiled by Jerry Corkran. The comments for sections pertaining to the power transformer aging will be compiled by Gustav Preininger. The comments for sections pertaining to the sealed tube aging will be compiled by Tim Raymond.

The chair finally solicited any volunteers to help with running the Working Group as a co-chair, specifically looking for a person representing an OEM.

Action Items:

1. Submit PAR by 4/15 – Chair
2. Submit comments to Chair regarding “conventional insulation systems” – all parties by 6/1
3. Provide comments related to overall document to Chair – all parties by 7/15.
4. Circulate comments to working group members (and attendees) prior to next meeting (by 9/1).
5. Provide copies of papers to Working Group Members. Will try and bring copies to next meeting (CDRom).

The meeting concluded at 10:25 AM.

Respectfully submitted,

Roger Wicks

Chairman

Robert Whearty

Secretary

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

Monday, March 8, 2004 San Diego, CA

The meeting convened at 8:00 AM with eleven of the fourteen members and thirty-one guests attending. The members and guests introduced themselves and the minutes of the Fall meeting in Pittsburgh were approved as written.

One returning and two new members were welcomed to the group. Three more persons were added to the list of persons requesting membership.

Old Business

The first item of old business regarded the Presentation on WTI's which was given in Pittsburgh. There were no comments offered by the group and discussion was limited to thanking the participants for their efforts.

The second item regarded the transformer testing and survey proposal which was sent to members and other interested parties. The proposal was distributed to explain the purpose and major details of the testing to potential transformer owners and manufacturers so they may assess whether the testing would be appropriate and / or consistent with their operations. The testing itself is intended to measure and log the winding temperature of various transformers in controlled heat runs and field load-demand operation in order to provide a basis for conclusions regarding response time and accuracy of several types of winding temperature indicators.. As a result of the discussion, two new potential sponsors have agreed to look at the proposal. It is hoped that four tests (two surveys and two heat run tests) can be completed in time to include the results in the next revision of the paper.

New Business

The first item of new business regarded the scope and charter of the task force as it relates to the topics covered in the technical paper. This topic was raised as a way to explain the deletion of some topics from the paper. A slide presentation of passed meeting minutes was given, showing that the original charter prescribed a significantly narrower range of topics than the paper contained in revision four.

The second item of new business regarded discussion of the changes to the paper from revision four to revision six. It was explained that revision six was not released because it had segments added that had not been sequenced or edited.

In summary, the paper has a proposed title revision, it was completely resequenced and 12 sections were either added or largely re-written. Many of the changes were discussed and due to the volume of comments it was requested that they be submitted through email for consolidation and re-distribution to the group.

The meeting adjourned at 9:20 am.

Respectfully Submitted

Phillip G. McClure

Chairman

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

The Task Force met on Tuesday, March 9, 2004 at 11:00 AM. There were 17 members and 22 guests in attendance.

The minutes of the previous Pittsburgh Oct. 8, 2003 meeting were included in the Subcommittee minutes, and were approved as corrected.

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

The Chair indicated that this might be the last meeting of this Task Force unless the IL SC requests further work

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

- The TF reviewed the new wording and editorial changes to this proposal. At the last meeting, it was recommended that a sentence be added to emphasize that a hot spot temperature rise limit of 80°C applies to all rated loading conditions. Changes to the last sentence revising “shall” to “should” and revising “all loading conditions” to “all rated loading conditions” are also in the final proposal
- The TF also discussed the proposal from one member to locate this proposal in a relevant section of the revision to C57.12.10. The chair of this WG already had expressed a reluctance to include this in the new scope of C57.12.10. The members of this TF present at this meeting, also agreed that it should not be part of C57.12.10, and that we should present this modified proposal 2 to the IL SC for their acceptance and inclusion in C57.12.00 Section 5.11.1.1 “Winding temperature rises”

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

Proposal 1 dealt with changes to the average temperature rise for ODAF cooling from 65°C to 70°C

- The TF reviewed the new wording and editorial changes to this proposal. At the last meeting, it was recommended that a sentence be added to limit the top oil rise to 60°C. This was added to make the limits in this proposal more closely follow IEC standard 60076-2
- The TF also discussed the proposal from one member to locate this proposal in a relevant section of the revision to C57.12.10. rather than in clause 5.11.2 “ Other winding rises” of C57.12.00. There was not unanimous agreement within the TF on this proposal’s location. A straw vote from the guests also did not indicate a true majority for inclusion in C57.12.00.

Since we could not obtain agreement, one way or the other, the members of this TF present at this meeting, agreed that we should present this modified proposal 1 to the IL SC for their acceptance and inclusion in C57.12.00 Section 5.11.2

These final proposals will be distributed to the Insulation Life SC before the next meeting in Las Vegas for a vote when we will review the results of the Subcommittee ballot and comments.

NEW BUSINESS

There was no new business
The meeting adjourned at 11:58

Respectfully submitted,

Dennis Marlow. Task Force Chair

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

The meeting of the Working Group was held March 8, 2004 at 11:00am in Boardroom West at the Catamaran Resort Hotel in San Diego, California. There were fifty (50) attendees; seventeen (17) members and thirty-three (33) guests of which seven (7) requested membership. The Minutes of the Pittsburgh Meeting were approved as written.

1. The discussion started on Clause 11.3.1.2 concerning the timings of the resistance readings after shutdown. The discussion centered on the 4 minute period for taking resistance readings.
 - a. Thang Hochanh of Hydro Quebec moved the discussion to the one-hour time limit between the last shutdown and the re-energization for the next test. If the required readings are missed during the four minute period, then the test should be restarted within one hour.

b. Bob Ganser didn't agree to such a blanket statement. He felt that the manufacturer should review other issues before using just a one-hour time limit: oil temperature, winding temperature, cooling equipment, etc. The manufacturer should return to the original test requirements concerning stabilization for guidance.

c. Joe Foldi commented that the manufacturer would have very different test results if they waited more than one hour as the winding will stabilize at a lower temperature and an error will result in gradient measurement as the losses are different. Most people agreed.

d. Jeff Ray mentioned that this one-hour time limit would be applicable in the case of a three winding transformer.

e. At this point, Thang clarified his position on the one-hour requirement and the fact that this time limit is most important if you miss your required readings during the four minute period, then you should restart the test within one hour.

f. Steve from Fort Pierce asked if this time could be shortened to 30 minutes.

g. Instead of a vote in the meeting, the Chair will poll WG members on the proposed revision to clause 11.3.1.2 prepared by Joe Foldi and Thang Hochanh via e-mail.

h. Don Platts asked if this was a replacement of Section 11.3.1.2. The Chair stated that it was a partial replacement of text in the clause and confirmed this with the authors, Joe Foldi and Thang Hochanh.

i. Don mentioned that the equation for calculating the resistance to shutdown be a part of the standard and not just a suggestion (graphical method in IEC 60076 or a formula).

j. Thang clarified that he will prepare an equation to provide clarity. Thang also asked that suggestions to be forwarded to his attention.

2. The discussion then moved to the second subject of revising Clause 11.5.2.1. Paulette Payne reminded the group that part of being a member is voting and responding to e-mail requests. During the last vote, she only received 13 responses out of 34 ballots on this issue of revising 11.5.2.1.

- 8 votes Yes

- 5 votes No

a. Various comments followed and Paulette read Subhash Tuli's and Don Platts' comments on the issue; which she had provided to the group as Subhash proposed temperature correction of no load losses.

b. The discussion centered around correcting no load losses as well as load losses. The current standard indicates that only load losses are to be corrected.

c. Joe Foldi mentioned that load losses were corrected to 85C for the guarantee; but, that no load losses were being corrected to 20C for the guarantee. This makes it unclear for the temperature rise test. Should no load losses also be corrected to 85C since this is the temperature for the actual testing?

d. Steve from Fort Pierce commented that the standard is not clear on the subject.

- e. Tim Raymond mentioned that the difference in losses is marginal and there may be little to no impact.
- f. Bob Ganser mentioned that some manufacturers actually calculate the core temperature and core hot spots. However, this doesn't affect the total no load losses.
- g. The idea is to calculate the total losses in the core. The core hot spot will not impact the core losses.
- h. Alan Darwin of Areva reminded us that the temperature correction is a minor impact overall.
- i. Martin Navarro of Siemens commented that there is an equation to correct to 20C and that most use this equation.
- j. There was a suggestion that we leave the standard as-is since the difference is 0.5% or less.
- k. Steve of Fort Pierce reminded us that we had moved off of the original subject of correction of the no load losses for temperature rise testing.
- l. Bob Ganser suggested that we change the standard to indicate that the no load losses be corrected to 85C for temperature rise testing purposes.
- m. Steve commented that the standard should provide consistency. He further commented that we should propose changes to provide this clarity and consistency.
- n. Bob Ganser reminded us that the standards need to be very clear and direct.
- o. Jeff Ray mentioned that the user should be happy either way. The 20C number is higher and therefore more conservative.
- p. Paulette then asked for a general consensus: should no load losses be corrected to 20C or 85C for temperature rise test?
 - i. 15 Votes Yes
 - ii. 5 Votes to provide Clarification
- q. Paulette referenced Linden Pierce's comments and asked if this proposed wording of clause 11.5.2.1 was clear. He mentioned that we should correct to 85C for temperature rise testing.
- r. Paulette will send out a new ballot to the WG via e-mail with the choice of either the wording proposed by Linden Pierce, or the original wording.

3. The third item of discussion was the method for generating the shut-down curve to determine winding temperature. Paulette reviewed the position that we currently have with this issue.
- a. Paulette referenced the Blume text which she had provided to the group. She asked if anyone followed the method outlined in Blume. Two manufacturers indicated that they used this method, others indicated they have developed their own techniques.
 - b. Bob Ganser mentioned that the first reading of any value to the curve was usually around 4 minutes due to core issues. He further mentioned that it is more critical to take the cold reading correctly and note the timing of the first accurate reading then. This will be an indication of the accuracy of the first hot reading. Also, the average oil temperature reading is very critical.

c. Steve mentioned that all factories do this differently and we need to define a clear method for performing the cooling curve in the standard so that all manufacturers are the same. The method should be based on the laws of physics and not averages or curve fitting methods.

4. New Business: Hasse Nordman of ABB Finland mentioned that they had performed some testing on a 2,500 kVA transformer with thermocouples in various locations to look at core, winding, oil gradients, etc.

a. The results for average oil were not as they expected.

b. They found very strange gradients.

c. The comment was made that transformers without forced oil have non-uniform oil gradients. Most people in the room nodded in agreement.

d. IEC uses average oil times 0.8 to correct for this inconsistency.

e. Bob Ganser mentioned that he has also seen this in larger transformers. This quickly leads to disagreements on oil gradients and ultimately the final hot spot determination.

f. Hasse Nordman mentioned that the current IEEE method would have led them to a hot spot value that was 10C to 20C higher than actual; due to the oil fluctuations.

g. The WG requested to have ABB Finland's test results and conclusions for review before the next meeting. These will be forwarded via e-mail.

5. There was a motion to adjourn; and a second.

The meeting ended at 12:15pm.

Respectfully submitted,

Allen Mitchell

7.1.3.7 Task Force Definition of Thermally Upgraded Paper- Don Platts, Chair

The Task Force and many guests met on Tuesday, March 9, 2004 at 8:00. Attendance was 5 members and 46 guests.

Don Platts, the chair, reviewed the activities since the October meeting, to establish a definition of thermally upgraded insulation. We conducted a survey of The Insulation Life Subcommittee to approve the definition agreed to at the last meeting. There was little response, only 15% responded at all. Accordingly, the approval of the definition was added to the agenda for the subcommittee meeting.

Based on the assumption that the task force accepted the definition, and therefore the Subcommittee would accept it, IEC has adopted that definition. The task force has turned its efforts to implementation of the definition in the IEEE standards.

To resolve issues with the definition, and the content of C57.100, we have concluded that the requirement for a minimum life expectancy for the insulation system must be a requirement in C57.12.00, not listed in the loading guide, C57.91, and in the Standard Test Procedures for Thermal Evaluation of Liquid Immersed Transformers, C57.100. To support that goal, the chair prepared a draft statement for inclusion in C57.12.00, which was primarily the existing wording, the Arrhenius curve, and the formula from C57.100. That was circulated to the task force members for review and comment.

The early feedback indicated concern with the appropriate end of life criteria and the corresponding minimum aging expectancy. Today we have 3 different sets of values in use, and it is creating confusion. A second concern was that the wording did not refer to the need to use “thermally upgraded paper”, but just to the minimum aging criteria of that paper as the minimum for any insulation system used. To resolve some of these issues, a second draft was prepared and circulated, but due to the short time available for review, and the lack of task force members at the meeting, this effort had little effect.

Hasse Nordman offered a suggestion to parallel the work of IEC and attempt to separate the theoretical life expectancy from the in-service life expectancy. His explanation left many in the audience puzzled, so the chair asked him to provide his comments in writing for consideration. [He has done so, and his comments are attached].

As noted above, there were very few members present, and most of the guests had no exposure to the discussion of previous meetings, so the chair had to regroup to address the many questions. He explained the need for this continuing effort, the objective of adding a requirement to the standard, and the basic plan to accomplish the goal.

Sheldon Kennedy commented that the thermally upgraded insulation is not only used for conductor insulation, but also for layer insulation on layer wound transformers.

The group got into an extended discussion of testing of different material and techniques, and evaluation criteria. The chair noted that this discussion is a part of the scope of the working group revising C57.100, not this task force.

There were comments in the discussion that those insulation temperature indexes are assigned to materials based on testing, and that our work should investigate that rating system, and ensure that our results are consistent with that, where appropriate. This has been referred to the working group chair.

The meeting adjourned at 9:20.

Donald W. Platts

Chair Task Force - Definition of Thermally Upgraded Insulation

7.1.4 Old Business

The TF for Definition of Thermally Upgraded Insulation conducted a survey of The Insulation Life Subcommittee to approve the definition agreed to at the last meeting. There was little response, only 15% responded at all. Accordingly, the approval of the definition was added to the agenda for the subcommittee meeting. By a unanimous vote, the subcommittee approved the definition. It will be included in the next revision of C57.12.80.

7.1.5 New Business

There was no new business presented.

The meeting adjourned at 9:15 AM.

Respectfully submitted by:

Donald W. Platts, Chair Insulation Life Subcommittee

Min. Insulation Life SC 0304.doc

7.2 Performance Characteristics SC – Ramsis S. Girgis, Chair

The Performance Characteristics Subcommittee (PCS) met at 11:00 A.M. on Wednesday, March 10, 2004 with 75 members and 33 guests in attendance. 4 of those guests requested membership in PCS.

7.2.1 Approval of Meeting Minutes

The minutes of the October 8, 2003, Meeting in Pittsburgh were approved as written.

7.2.2 Chairman's Remarks

7.2.2.1 Administrative Subcommittee Notes

- 1) Next Standards meeting dates and locations are as follows:

Fall 2004: October 24 –28, Las Vegas, NV

Spring 2005: Jackson, MS

- 2) IEEE PES meeting future dates and locations are as follows:

Denver, Colorado: June 6–12, 2004.

San Francisco, California: June 12 – 16, 2005.

- 3) The Administration Committee is looking into the possibility of a different format for the Thursday Transformer Standards Committee meeting. Suggestions from members of the Administrative SC were solicited. The Chairman, Vice Chairman, and the Secretary of the Transformer committee will be reviewing those and will come up with a recommendation.
- 4) The Administrative SC is looking for candidate projects to use internet on-line technology, to hold working sessions between regular meetings, allowing individuals to participate jointly, each from their own work location.
- 5) Particular attention must be paid to resolve issues with the C57.133 (Guide for S.C.testing) possibly being withdrawn. The PC SC and the Standards SC will work with IEEE to resolve the outstanding issue of the clarity of the figures in the document.
- 6) The Administration Committee is looking into a process of rewarding members of TFs and WGs who contribute significantly to the activities of, and the documents produced by, these groups. Plaques of appreciation would be presented to these individuals.
- 7) Minutes of this meeting should be sent to the Transformer committee Secretary, Tom Prevost, before April 30, 2004.

7.2.2.2 Membership

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

Miguel Oliva, ABB Cordoba, Spain
Peter Zhao, Hydro One

Dieter Wagner, Hydro One
Sue McNelly, Xcel Energy

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

7.2.3 Agenda Changes

None

7.2.4 Working Group and Task Force Reports

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

The PCS working group for Revisions to test code C57.12.90 met in San Diego CA on March 8, 2004 at 9:40 A.M. There were 52 persons in attendance, 34 members and 18 guests. 5 guests requested membership in the working group. After introductions, the minutes from the last meeting were reviewed and approved.

Old Business

Subhash Tuli announced that C57.12.00 and C57.12.90 will be recirculated in April.

There was a discussion of the proposed draft #4 of WGgWG Item #11 “Proposal for Single Phase Excitation Tests”.

1. Section 1.4 Test Procedure - Mark Perkins’ objection to the second test (H₂- H₁, Figure 2 & Table 2) . Was discussed. After some discussion from the floor, consensus was reached to remove this test.
2. Section 1.1 General – Steve Antosz commented that the last sentence in paragraph one “While benchmark data is not required to interpret field test results, it is recommended that a reference test be performed in the factory as a benchmark for subsequent tests.” should be deleted. This comment was approved.
3. Section 1.3 Equipment - Marion Jaroszewski commented that Watts loss is not necessary and since some equipment does not provide this measurement that it should be shown as an optional measurement. After brief discussion it was decided to remove Watts loss as a required measurement.
4. The question was also raised in this section on grounding the guard in the UST mode. This section will remain unchanged (The need for a ground is explained in the section.

5. Bill Boettger – Pointed out typographical errors in test #2 on Table #4.
6. Section 1.4- Bob Hartgrove expressed concern that only four tests (Table 1) are sufficient. Joe Foldi recommended testing in bridging positions where applicable. The group decided that the 4 LTC-positions tests are sufficient. Tom Harbaugh recommended using maximum and minimum taps in place of 16R and 16L. A note will be added to explain why these 4 positions are sufficient.
7. Comments on the section on “Operational tests of Load Tap Changers” will be implemented and will be sent to the WG members for survey in the next 2 weeks.
8. A proposal to revise the Zero Sequence Test was discussed. There was enough controversy on this item that the chairman will be discussing it with a few members of the WG before making a final recommendation.
9. A proposal to modify two clauses in the S.C. section of the Standard were discussed; one to change the wording of “Close enough to voltage zero” to a specific value such as 15 degrees (as in IEC), and the other to change the 2% maximum change in Impedance of the transformer after the S.C. test to 1% in Category 4 transformers (as in IEC). Pierre Riffon will submit the modified text to be included in the next review by the WG members

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

The Working Group met on Monday, March 8 at 1:45 PM. There were 28 members and 49 guests in attendance. The following 3 guests requested membership, and are welcomed into the Working Group, bringing the total membership to 66 members:

Craig Stiegemeier	ABB Inc., St. Louis, MO
Miguel Oliva	ABB Inc., Cordoba, Spain
Peter Zhao	Hydro One, Toronto, Canada

Following introductions, the minutes from the October 6, 2003 Pittsburgh meeting were approved as submitted.

Subhash Tuli reported that the latest draft of standard C57.12.00 would be re-circulated using the existing balloting pool, probably by mid-April 2004.

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

WG Item 50, C57.12.00, Section 7.1.5.3: System characteristics for short-circuit calculations. A comment received from the draft 3 ballot of C57.12.00 – 2000 stated that the default value of $X0/X1 = 2.0$ as given in the standard, is too high. The user suggested a value between 0.60 and 0.40.

This proposal was initially discussed at the autumn 2003 meeting of the Working Group, but it was determined that more data needed to be collected from other users to make a more informed decision. As a result, the PCS committee and this WG were surveyed for more data on system values of $X0/X1$. Nine (9) utilities responded, and their responses were reported at the meeting. This data showed much diversity, with values ranging from 0.2 to 5.0, depending largely upon the location on the power system. Comments from several manufacturers indicated that changing this ratio would have very little effect upon the design of most transformers. After much discussion, the WG voted 15 – 0 in favor of changing the standard to a lower number. After more discussion, the value 1.0 was proposed and voted on, with those present accepting this value by a vote of 32 – 0.

WG Item 52, C57.12.00, Section 9.2: Tolerances for Impedance.

A comment received from the draft 3 ballot of C57.12.00 – 2000 stated that the user felt the impedance tolerances given in the standard were not clear, and that the tolerances were too great. The suggestion was to halve the present tolerances and to add a tolerance on different tap positions.

This topic was initially discussed at the autumn 2003 meeting. The PCS committee and this WG had been surveyed on this proposal in July 2003, and the results of this survey provided the basis for the discussions. The survey had shown a definite split, with users in favor of reduced tolerances, and manufacturers wishing to not make a change. Some of the comments from the floor pointed out that for large substation and GSU transformers, it is clearly more critical for closely matched impedances than for distribution units. Also, designs with rectangular core/coil construction with high bus reactance are more difficult to accurately predict the impedance.

After much debate, a vote was taken to determine if there was sufficient interest to support a change to the standard. By a count of 47 – 2, those present voted to not change the standard.

WG Item 53, C57.12.00 Table 19 and Sections 8.2 and 8.3.2.2: Routine, design, and other tests for liquid-immersed transformers.

Comments received from drafts 3 & 4 ballots of C57.12.00-2000 requested that the zero-sequence impedance test be made a routine test for transformers 501 kva and larger with wye connected high-voltage and low-voltage grounded neutrals, and that these results be listed on the test report.

The discussion on this topic revealed that a better definition on the scope of the proposed change is necessary. Adopting the changes as proposed would affect a lot of products where the test is not needed or would be meaningless. A quick vote of the attendees showed that 25 were in favor of leaving it classified as an “Other” test, 15 as a “Design” test, and 8 as a “Routine” test. Using e-mail, the chairman will work with the WG members to better define the scope of this proposal, for additional action at the next meeting.

WG Item 54, C57.12.00 Table 19 and Section 8.2: Routine, design, and other tests for liquid-immersed transformers.

A request was received to add test requirements for buried tertiary windings, specifically an insulation resistance (Megger) test at 2.5 kV (DC) for 1 minute, and winding DC resistance measurement.

This request was introduced to the working group at this meeting, but time did not permit much discussion. The topic will be discussed at the next WG meeting.

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

- 16 members and 15 guests attended, with 2 guests requesting membership.
- Minutes from the Pittsburgh meeting, Oct 7, 2003, were read and approved.
- Because of the serious illness of Eddy So, the TF meeting for “Guide of Low Power Factor Power Measurements” was canceled and thus there was no report. Eddy So will be contacted to discuss his future involvement.
- Frequency Conversion Factors of Transformer Performance Parameters
 - Revised wording in C57.12.90 Section 9.4.3 (Impedance voltage) – The WG agreed and discussed the following:
 - It was shown that the impedance voltage is nearly proportional to frequency. The error of using a frequency ratio can be 0.5% for small transformers (< 50MVA) but the error is negligible for large transformers. WG discussed if this would be valid for distribution transformers where the x/r ratio is lower, however since the wording has the word “nearly” this was acceptable to WG.
 - The WG agreed to check the availability of x/r ratios for distribution transformers for the next meeting.
 - The proposed wording was approved by the WG.
- Revised wording in C57.12.90 Section 12.4.7 - Short Circuit Test – The WG agreed and discussed the following:
 - The voltage applied would be nearly the ratio of the frequency (as per the discussion on impedance voltage)
 - The WG agreed that the correct symmetrical and asymmetrical currents calculated for rated frequency should be applied

- The WG discussed if the duration of the first asymmetrical peak would be a valid test for either 50 or 60Hz. Since IEC accepts either frequency (see IEC 60076-5 Section 4.2.5.3) the WG agreed that it is a sufficiently valid test. It was also noted that most of the few short circuit test facilities have both frequencies available.
 - Change the word “should” to “would” in the last sentence
 - The WG agreed on the proposed wording with the above change.
- Revised wording in C57.12.90 Section 11.7 - Temperature Rise Test – The WG agreed to the following:
 - The stray loss must be removed from the winding rise test calculations. This will be revised for the next meeting.
 - It was shown that the injected current must be increased by a few percent to account for the reduced eddy and or stray loss. Revised equations will be shown for the next meeting.
 - It was agreed that there is no correction required for the measured oil or winding rise if the correct rated frequency losses are applied.
 - A comment should be added to the wording that direct hot spot temperature measurements would not be valid since the eddy loss will be not be correct.
 - It was agreed that measured tank rises would be off by a few degrees C and wording should be added on this.
 - Revise in the first paragraph “and stray loss” to “and or stray loss”.
 - Revise the current equation as per above comments.
 - Remove the 4th paragraph (on winding rise) and remove the temperature correction equation.
 - Revise the 3rd paragraph “measured oil rise” to “measured oil & winding rise”
 - Revise the 2nd last paragraph to “The measured tank temperature rises could be in error by a few degrees C since the stray losses will not be correct”
 - Revise the last paragraph to “Temperature rise tests at 60Hz instead of 50Hz could be done in a similar manner as done above.
- New Business – The WG discussed:
 - Load noise could be an issue for sound level frequency conversion. Since it is not defined yet in ANSI standards, it was agreed to leave this item to a later time.
 - It was noted that the sound level only applies to no load noise at present. It was agreed by the WG to investigate how FA sound level should be corrected for frequency for the next meeting.
 - It was discussed if the load loss should be corrected if not exactly rated current is applied. Many WG members thought there was a correction for this in 12.90, but it will be investigated for the next meeting.

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

The Working Group on Switching Transients Induced by Transformer/Breaker Interaction was called to order at 8:02 AM on March 9, 2004. There were 57 attendees, 24 members, 2 requesting membership, and 31 guests. The agenda for the meeting was reviewed, and the Minutes from the October 7, 2003, meeting in Pittsburgh, PA were approved.

1. Status: Draft 1.6 has been distributed electronically and has been reviewed by IEEE Editorial Staff. They had the following comments: The header need updated, the copyright date needs to be 2004, revised the “use at your own risk” clause, and requested that figures be redrawn before official balloting
2. Several paragraphs on FRA were added, along with definitions, and a second example.
3. The only remaining issues are any information the Switchgear Committee would like to provide and revision of drawings.
4. The current draft was sent to PCS and this WG for comments. The intention is to then initiate a formal ballot prior to the Fall meeting.
5. Continued coordination with the SWGR Committee is encouraged.
6. A discussion on the level of detail required for modeling transformers indicated that simple or single capacitance models accuracy would be limited to a narrow range of frequencies. It was suggested that a simple terminal model could be utilized to determine if there was a concern, and then, if so the transformer could be studied in detail. It was acknowledged that transformer models become very complicated, particularly at very high frequencies as turn-to-turn capacitances have to be considered. Moreover, one must consider that for small transformers it may make sense to install a snubber versus the effort to study it in detail.
7. There was no new or old business.

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

The W.G. met in the Macaw Room of the Catamaran Resort Hotel from 11:00 a.m. to 12:15 p.m. There were 11 members and 7 guests present. One of the guests, Carlo Arpino, requested membership. The following are the highlights of the meeting:

1. The Chairman informed those present that the Re-circulation Ballot re the Reaffirmation of C57.21 was successful. All pertinent documentation was submitted to the IEEE Standards Board by Peter Balma.
2. The Chairman informed attendees that Anne Bosma of the IEEE Switchgear Committee has reviewed the annex on dielectric stresses imposed on shunt reactors during switching and approved Draft #4 (as written). Therefore, the two proposed annexes are now in good shape; switching stresses and TCRs.
3. Pierre Riffon's proposal to combine the current Tables 5A and 5B into a single Table 5 was reviewed. Pierre's latest revision was the basis for discussions. Note the Chairman will send Pierre's latest revision to Table 5 with the minutes and a presentation by Pierre re the rationale behind his revision. The following are the highlights:
 - (i) The combined Table 5 covers "Y" connected shunt reactors only. A discussion took place regarding Delta-connected shunt reactors. If shunt reactors are Delta-connected, they are usually tertiary connected units; 13.8kV, 34.5 kV and 69 kV. Pierre Riffon mentioned that a T.F. chaired by Phil Hopkinson is looking at dielectric test level implications for Delta-connected transformers; C57.12.00. A second table covering test levels for Delta-connected shunt reactors will have to be developed for C57.21 based on the preceding considerations.
 - (ii) In developing the combined Table 5 revision, harmonization with IEC was considered. One BIL value is provided per maximum system voltage. Note that the maximum system voltage is used vs. rated voltage. The highest BIL for the maximum system voltage is used in Table 5 due to the switching duty seen by shunt reactors.
 - (iii) The chopped wave crest test value is 10% higher than BIL.

- (iv) Front-of-wave test voltage levels have been deleted since front-of-wave tests are not, in practice, carried out. Attendees agreed with this proposed change. It was noted that the test code will have to be revised accordingly; Clause 10.3.5.5 will have to be eliminated.
 - (v) Switching impulse test level is $0.83 \times \text{BIL}$.
 - (vi) The low frequency overvoltage test and test levels were discussed at length. Pierre's proposal was an attempt to harmonize with the latest revision process now in progress for the IEC reactor standard. A low frequency short duration test (7,200 cycles) is proposed for maximum system voltages up to 121 kV. An enhancement of 1.7 pu for 7,200 cycles followed by a one-hour test at 1.5 pu is proposed for up to 555 kV maximum system voltage. For 800 kV a one-hour test at 1.7 pu is proposed. The main issue re Pierre's proposal was the impact on manufacturers test capability. Manufacturers will review the impact and report back to the W.G. Pierre Riffon will continue to coordinate with Christoff Ploctner (IEC W.G. Chairman), especially re enhancement levels.
 - (vii) The Turn-to-Turn test is now applicable to both dry type and oil immersed shunt reactors. Note that the rise time to the first peak of the applied decaying sinusoidal overvoltage is of the same order as the front time of an impulse.
 - (viii) Differences re test code for dry type and oil immersed shunt reactors should be covered in the notes to Table 5.
4. Table 4A (oil immersed shunt reactors) should include as "OTHER" test a determination of magnetic characteristics; linearity. The current Clause 10.9 covering the test code is inadequate and must be rewritten; a procedure based on that in the HVDC smoothing reactor standard will be developed. Pierre Riffon will produce a draft.
 5. Table 3, which covers temperature rise limits, was discussed. The issue was whether temperature rise limits for oil immersed shunt reactors should be changed or better defined. Current temperature rise limits are based on continuous operation at 5% above rated voltage. Should limits be based on continuous operation at maximum system voltage? This is the basis for Pierre Riffon's proposed modification for Table 5. A consistent approach must be used in this version of C57.21.
 6. In order to harmonize with IEC continuous operation at maximum system voltage should be the basis used throughout C57.21. The next draft of a revision of C57.21 should reflect this.
 7. The Chairman requested feedback from all W.G. members even if it is only to confirm satisfaction with current drafts.

The Chairman will prepare Draft #2 based on the preceding discussions and actions. It will then be circulated to all members. The meeting adjourned at 12:15 p.m.

7.2.4.4.1 Semi-Conductor Rectifier Transformers, C57.18.10, WG – Sheldon Kennedy, Chairman

- C57.18.10 was reaffirmed after the last meeting. Negative votes were resolved by agreeing to make a revision to the standard and consider the negative comments. At the meeting in Pittsburgh, it was decided that a task force should be formed to consider the comments received during the reaffirmation.
- There were several comments pointing out errors, missing references, and undefined terms. These need immediate attention.
- The Task Force decided to have a corrigenda revision of C57.18.10 to correct the errors and missing or undefined terms. This should be accomplished rather quickly and make the standard more accurate. The other more substantial comments will be considered in a revision to follow the corrigenda revision, but before the next five- year period of the life of the standard. The Chair will prepare a PAR for a corrigenda revision and submit it to IEEE.

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

The WG met with 6 members and 14 guests. Draft 1 was handed out. Initial discussion centered on the Definitions section. It was agreed that the standard placement is in the main body, not at annex. Also, should all definitions be covered or only the ones not covered elsewhere in IEEE. Peter Balma will investigate.

An electronic version of the Draft will be posted on the website.

Devki Sharma will work on the Introduction section. Lars Erik Juhlin asked if application information should be listed for NGDs. Devki Sharma will check C62.

Richard Dudley discussed the test section. It was decided to list the test requirements for each device in their section. Richard will contact Christoph Plotner to get info on Peterson coils from the IEC Standard.

Oil immersed reactors were discussed and since they are rare, a reference to C57.21 will be made.

Lars Erik volunteered to revise the Ratings section.

The Chairman will request a copy of C62.22 from Tom Prevost to help the WG. The Chairman and Emilio Morales volunteered to revise the Grounding section. Peter Balma will review sections 6 & 7: Basis for rating insulation classes and dielectric levels.

Fred Elliot asked the WG to verify that the comments from previous WG members were addressed in the new draft. The Chairman will do this.

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

The PCS task force met for the development of a guide for Frequency Response Analysis (FRA) in San Diego, California on March 9, 2004 at 3:15 P.M. There were 39 persons in attendance, 21 members and 18 guests of which 3 guests requested membership.

Rowland James made a brief report on the development of the draft and thanked the contributors for the efforts put forth in the development of the guide. He also announced that a PAR will be submitted for approval.

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

Charles Sweetser reported that he received contributions for all six sections. The contributions were appended as submitted. Each section was then discussed.

- **Section 1: Scope and Application** – Progress has been made on this section. A definition section was added, however definitions are needed. Further input of expanded use and application is also needed. It was recommended to add verbage regarding baseline, sister units, and phase comparisons in section 1.1. Subhash Tuli will review this section for technical content.
- **Section 2: Test Parameters** – Ernst Hanique discussed test leads and emphasized that test lead lengths must not differ more that one centimeter. Fred Elliot and Sokom An reported in absentia that greater repeatability is possible when testing the high voltage because test leads are fully extended. Careful attention should be given to placement of the leads performing

measurements on shorter bushings. Richard Breytenbach commented on the use of either magnitude or phase measurements. He stated that they are directly related to one another and therefore there should be no difference in the results. Sokom An will be asked to provide additional review to this section.

- **Section 3: Measurement Parameters (test plan)** - A section on safety is included in this section. Diagrams have been added to illustrate various test setups. Charles Sweetser discussed types of test; namely, open circuit, short circuit, inter-winding tests, and displayed typical test curves. He asked the TF if we should establish a convention. This section will be further reviewed by Richard Breytenbach.
- **Section 4: Test Records** – Open data formats and nameplate data requirements were discussed. This section requires further development to determine what will be the recommended format and required fields. Bertrand Poulin and Barry Ward will address this section.
- **Section 5: Analysis and Interpretation** – Three perspectives were submitted regarding interpretation (Sweep, Impulse, and Objective Winding Asymmetry). The group expressed that we need to document what we already know. Richard Breytenbach made a brief presentation on FRA interpretation and explained the significance of the lower frequency range (core displacement) and the mid range, 50-200 kHz (bulk winding movements). Larry Coffeen gave a presentation on NEETRAC's technology that will produce a predictive maintenance system that is designed to detect loose coils. Richard Breytenbach, Larry Coffeen, and Charles Sweetser will work on this section.
- **Section 6: Appendix I** – Bob Degeneff will continue to develop this section.

Charles Sweetser announced that the Task Force will establish a relationship with CIGRE regarding FRA testing

7.2.4.6 Core Over-excitation TF – Craig Steigemeier, Chairman

The meeting took place at 8:00 am on March 8th, 2004. There were 79 Guests in attendance, 55 of them requested membership.

This was the first meeting of the Core Over-excitation Task Force. This Task Force is charged with the identification of limits for core over-excitation and coming up with suggestions for modification of appropriate standards.

Background information based on the 2nd panel presentation made at the Fall 2003 Pittsburgh meeting was presented. This Panel Discussion, titled "Power Systems Over-voltage Requirements and Their Impact on Transformer Design", initiated the focus on the general topic of over excitation of the transformer core. Panel members included Donald Chu, Ramsis Girgis, Harold Moore, Bipin Patel, and Gustav Preininger.

A written suggestion was received from Harold Moore (not in attendance) for specific items to add to the standards and to include in a tutorial. General consensus was reached to improve/enhance the over-voltage definition in standards and to create an educational tool to enhance the general understanding of over voltages and their impact on the transformer. The expected affected standards are 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) and C57.104-1991 (IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers).

A discussion was held to review the key factors that should be incorporated in standards and/or in a tutorial. These factors include the need for IEC standard coordination, covering various loading scenarios (step-up, step-down, generator startup, etc.), the need for a general curve of capability versus power factor, coordination with unit connected generator standard, and sound level.

Volunteers were requested for a small group of the task force that would create a proposal for standard enhancement and an educational guide or tutorial before the fall meeting. The volunteer group assembled included 3 manufacturers and 10 utility/consultant organizations. The task Force Working Volunteers included:

Peter Balma, PSE&G
Stephen Beckman, Fort Pierce
Donald Chu - ConEd
Ramsis Girgis - ABB
Peter Heinzig - Siemens
Harold Moore - Consultant
Rowland James - Entergy
Miguel Oliva - ABB
Bipin Patel – Southern Comp
Gustav Preininger - Consultant
Ed teNyenhuis - ABB
Bob Tillman – Alabama Power
Subhash Tuli – Waukesha
Loren Wagenaar – AEP

Dieter Wagner – Hydro One

Peter Zhao – Hydro One

E-mail and/or web meetings will be used to trade information before the fall meeting so that a proposal for a standards modification or enhancement and an instructional guide may be reviewed at the fall meeting.

7.2.5 Project Reports

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

IEEE removed the PAR of this Guide and therefore the document has been withdrawn. Niguel was absent from this meeting. The Performance characteristics and Standards SCs will work with IEEE to resolve the outstanding issue of the clarity of the figures in the document.

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

Reaffirmation of the document is to be finalized by end of 2004. Rick will form a TF at the fall meeting to resolve some of the issues raised earlier.

7.2.5.3 Panel Discussion “Zero Sequence Impedance” – Ramsis Girgis Chairman

Mr. Gerry Rosselli of San Diego Gas & Electric gave this tutorial. A large group of over 50 individuals attended the tutorial. Gerry presented his proposed test, which he personally developed recently. As reported by Gerry, there is not a test available in the industry Standards today to measure the Z₀ impedance of transformers with interconnected windings. The method is based on performing three 3-phase tests and using a simple formula to calculate the Z₀ impedance of the transformer. The method can also be used for any transformer. Gerry presented comparison data to confirm the accuracy of the new method.

Subsequent to the tutorial, a group of 3 members of the C57.12.90 WG and Gerry was formed and will be developing text for this and alternate tests for discussion at the next WG meeting in the fall. Bruce Forsyth was nominated to chair this group. The presentation will be posted on the transformer committee website next week.

7.2.6 Old Business

None

7.2.6 New Business

None

7.3 Power Transformers – Red Hager, Chair

The Power Transformers Subcommittee met Wednesday afternoon, March 10th at 1:30 pm with 103 in attendance including 49 members and 54 guests. 16 of the guests requested membership in the subcommittee and will be added to the membership roster.

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

7.3.1 WORKING GROUP AND TASK FORCE REPORTS

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

The Chairman called the meeting to order at 8:00 am. There were 10 attendees. This was the 5th meeting of the group since the start of the Task Force project. A written handout containing the minutes of the last meeting and work input from the Task Force members was distributed for review and comment.

The first order of business was the review and approval of the minutes from the October meeting that was held in Pittsburgh, PA. The members present approved the minutes.

The Chairman reviewed the status of the Task Force and progress to date.

A review of Old Business by Section resulted in the following comments and action items:

Section 4, Ratings

- Decided to keep the “old” table for voltage ratings of 34.5kV and below
- Discussed the point of view by some members that the ratings table with respect to large furnace transformers is not flexible enough. Further review will be necessary to resolve this issue.
- Recommend changing the chart of ratings, minimum and maximum low voltage values, to Typical to acknowledge latest design and furnace requirements (ref. Tables 4-2 and 4-3 of C57.17/D1).
- Add 46kV class to Table 4-1. In addition, a recommendation was made to use the same ratings as listed in C57.12.00, which will be taken into consideration.

Section 9, Construction

- Recommended moving the Item 9.1.3, Vector Relationship from Construction to Section 4, Ratings
- Briefly discussed the impact of metrification efforts on the Construction Section

- Reviewed the physical arrangement of Secondary Bars with the intent to relieve historical restrictions on present designs and to concentrate on electrical characteristics such as ampacity and dielectric clearances
- Contributors were requested for Section 9.4, No Load Tap Changers and Section 9.5, Load Tap Changers.

Appendix A, Dissolved Gas in Oil Analysis

- Frank D'Amico submitted a write up for this Appendix to include a Guide for the Interpretation of Gasses Generated in Electric Arc Furnace Oil-Immersed Transformers.
- Members are to review this data and to submit comments prior to the next meeting.
- The Chairman is compiling data using a comprehensive database available to him through his employer, S.D. Meyers, Inc. He will make this available as soon as he gets the results.

Appendix B, DC Arc Furnace Transformers

- Mr. Ugo Piovan has agreed to assist in writing this section.

Appendix C, Guide for Protection of Arc Furnace Transformers

- Mr. Tom Slovik submitted a calculation method for protection of a large AFT and requested input from the group on scope of inclusion

Under New Business, the Chair again solicited for participation of the members to include submission of new input and review to include comments of the latest submission of data from the group.

The meeting adjourned at 9:00 am.

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

Acting Chairman: Peter M. Balma reported that the Working Group for The Installation of Liquid-filled Transformers was called to order at 9:35 AM on Monday March 8, 2004. There were 57 attendees, 28 members, 3 requesting membership, and 26 guests. The agenda for the meeting was reviewed; and minutes, material on storage guidelines, a suggested clause on shielding and a comparison of this guide versus related EPRI guidelines were distributed.

The agenda for the meeting was reviewed, and the following items were completed at this session:

- Agenda review
- Introductions
- Progress Update
- Storage Guidelines
- New Clause
- Guide Comparison
- Guide Format
- Adjournment

Progress Update: PAR was approved June 13, 2002, a revised PAR is required to include maintenance in the title, Draft 5 of Guide has been assembled, Clause 4.6 Preliminary Oil Filling was removed, Clause 4.9.3 Hot air circulation for drying will be retained, and a section on cold weather Dewpoint testing is needed.

Storage Guidelines: A new clause, Storage 4.14, has been added to Draft 5 and was reviewed in detail. Thanks to Malcolm Thaden for this contribution, which generated substantial discussion at the meeting.

Clause 4.14.1.1

- Question: What is relatively level in storing or installing a transformer, what If I have a transformer on a large slab that has a 1 or 2 inch differential. Comment: As long as sound is not an issue not a problem. Perhaps relatively level should be removed from this clause.
- Comment on that storage in oil seems to only be addressed in last paragraph of 4.14.1.1, consideration should be given to storing the transformer in oil regardless of time in storage.

Clause 4.14.1.2

- Comment from Don Chu that you need to pull a vacuum on a transformer to remove nitrogen from the transformer after storage in same, prior to entry into the transformer.
- Peter Balma indicated that rather than use the term “dry air”, maybe we should use the term “breathable dry air” throughout the document.
- Comment: Even if a transformer is stored in dry air, it needs to be purged.
- Comment: For ester-based fluids you may not want to fill with dry air. Ester based fluids WG will be contacted for input. (Patrick McShane)
- Comment: Should we reference OSHA for requirements relative to entry into a transformer?
- Comment: More users are requesting dry air. Not aware of any papers on the effect of use of dry air versus dry nitrogen storage. Should we be more specific and not allow alternatives? Based on this discussion the working group voted on whether both dry air and dry nitrogen should be described in the guides. Consensus of the group was to leave both in.
- Comment: The word “dry” should be added before “nitrogen.”
- Second to last paragraph – does this apply to both dry air and gas filled or how long stored?

Clause 4.14.1.2.1

- Change number to 0.1 – 0.3.

Clause 4.14.1.2.2

- Comment: What is preferred? Maybe the guide should indicate that the best or preferred

method of storage is in oil, however, some manufacturers permit storage in dry nitrogen or air for up to 6 months or longer.

- Comment: The term “elevated pressure” should be quantified, perhaps 4-5 PSI and not beyond the pressure relief device setting. The pressure should not exceed 5 PSI.

Clause 4.14.1.2.3

- Add paragraph stating that regardless of the length of the storage period, user should consider providing power to cabinet heaters and/or placing desiccant filled bags in the cabinet.
- A suggestion was made to add a paragraph to address installation/assembly delays when the six-month storage period has been extended do to unintentional delays.
- Should guidance on whether a transformer should be fully dressed as a spare (including radiators), or just oil filled for storage, be provided?
- Comment: The proper storage environment should be considered, including oil containment, seismic restraint, grounding, etc.

A new clause, Internal Shields, was submitted and suggested by Wayne Hansen. It was indicated that the clause could be added to Clause 4.7, however, that the title should be changed to Internal Grading Shielding.

Guide Comparison: Thanks to the efforts of David Wallach, a handout, which compared C57.93 versus EPRI guidelines, was reviewed and resulted in the following comments.

- Paragraph 4.8.2 Vacuum Treatment: Utilize the existing information in IEEE standard.
- Paragraph 4.8.3.2 Vacuum Leakage test – EPRI has provided more detail. It was suggested that we use table from EPRI as it has more recent information, and to investigate as to why it is a little different.
- Paragraph 4.8.5 Vacuum filling – hold vacuum: EPRI indicates based on voltage class of transformer, should this be considered. When does vacuum time start? When you reach specified level, or when you turn on the vacuum pump. The guide will be checked to determine if this needs to be clarified.
- Group was asked to provide any additional input related to this analysis/comparison to either the working group chair or secretary.

The format of the present guide, which distinguishes between transformers rated less than 10 MVA and 69 kV, and for those rated greater than 10 MVA and 69 kV, was reviewed with the intent of resolving the final format for the guide. Should these two clauses be blended, left as separate, or have common sections pulled out up front. The working group voted to leave as is.

In the next several weeks, Draft 5 of the guide will be placed on the transformer committee website for use by the working group.

The meeting adjourned at 10:45 AM.

7.3.1.3 WORKING GROUP FOR STANDARD CONTROL CABINET DESIGNS – Joe Watson, Chairman

The new Working Group met at 11:00 am on Monday, March 8, with 28 in attendance. There were 13 members and 15 guests. None of the guests requested membership.

The minutes from the Pittsburgh meeting were approved as submitted.

The group was informed that the PAR has been approved, changing the Task Force that has discussed this issue into a Working Group. The document will be a Trial Use Standard.

Joe indicated that only one response was received for input into Draft 1 (Guide for the Layout, Design, and Construction of Control Cabinets for Power Transformers). There are four main sections that require the most work: cabinet construction, components, modular cabinet designs, and cabinets for different types of transformers.

The list of volunteers from the Pittsburgh meeting was reviewed, and additional volunteers were requested. Jane Verner agreed to help with the first two sections.

Joe discussed the wiring layouts, and suggested that the control cabinet be divided into quadrants. He suggested that several manufacturers get together to try to decide which components would go where. Steve Schappell volunteered to lead this effort. Tim Huff, Brent Hayman, and Enrique Betancourt all agreed to participate.

Discussion took place concerning placement of items in the cabinet, and the number of variations we wish to present. It was decided that we would come up with a basic layout, and allow users to review it to see how it meets their needs.

It was suggested that we compare the requirements in C57.12.10 to ensure that all required items are addressed. New electronic temperature monitors that mount outside of the cabinet were discussed. Standards for relays, breakers, etc. were discussed. It was decided that the guide would contain definitions for these items, as well as information to size them.

Joe stressed that he would like to get input for the next revision of the Draft within the next 60 days. Susan McNelly will be asked to post the current Draft on the website. The goal is to have a completed revision 2 of the Draft in time for the Fall meeting.

The meeting adjourned at 12:00 pm.

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

The Working Group on LTC Performance met on Monday, March 8th with 8 members and 32 guests attending. Eight of the guests present requested membership in the Working Group.

The main discussion covered a comparison of C57.131-1995, "Requirements for Load Tap Changers," with IEC 60214-1, "Tap Changers Part 1, Performance Requirements and Tests." Each paragraph was placed in one of four categories:

- Same: The paragraph in C57.131 and the corresponding paragraph in 60214-1 are identical or convey the same meaning.

- Different: The two documents convey different meanings covering the same topic.
- 131 Only: The information is contained only in C57.131.
- 60214-1 Only: The information is contained only in 60214-1.

With the differences identified, a Working Group survey will be conducted, asking members to vote separately on each item, as to whether or not changes should be made to C57.131 for that item. In addition to a review of IEC 60214-1, the IEEE reaffirmation ballot produced a list of 14 proposed revisions to C57.131. The Working Group survey will include the 14 items from the IEEE ballot.

The Working Group survey will have a 45-day return period. During that time a first draft of an application Guide will be prepared. The source of information for this Guide will be the latest drafts of the IEC Guide 60213-2.

This Working Group has two documents that it is working on concurrently. We are unsure what numbering will be used for the two related documents, but the Working Group Chair will discuss numbering with the IEEE NESCOM administrator. Because we are working on two documents, the Working Group would like to request a second time-slot for subsequent meetings so the requirements document could be discussed at the first meeting, and the application Guide could be discussed at the second meeting.

With that, the meeting adjourned at 2:45 pm.

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

The Working Group met at 3:15 pm on Monday, March 10, 2004 in San Diego, CA. There were 53 members and 45 guests in attendance.

After introductions of members and guests, the chairman announced that Bill Bartley had been appointed co-Chair of the Working Group. Bill was previously vice-Chair and Secretary.

The first item on the agenda was the status of the draft. The draft is essentially complete – with just one article outstanding. The draft guide has also been completely reorganized to make it easier for the reader to find a particular subject matter.

The draft will be sent into the IEEE, in the upcoming months, for a pre-ballot editorial review.

The draft will be circulated to the working group membership by the end of the summer, for a straw ballot.

Volunteers were selected to review the major sections of the Guide.

Comments were received from the floor regarding changes to Section 4, Risk Assessment.

The meeting adjourned at 4:15 pm. The next meeting will be in the fall of 2004.

7.3.1.6 WEST COAST WORKING GROUP - Michael Lau, Chairman

The meeting was called to order by Red Hager at 08:00 am on March 9, 2004 with 21 members and guests in attendance. Two Task Forces discussed business during the Working Group meeting and both Task Forces presented reports in the Subcommittee meeting as follows:

7.3.1.6.1 TASK FORCE ON NEW GUIDE COVERING TRANSPORTATION ISSUES – Tom Lundquist, Chairman

The first item of business was the forming of a Task Force chaired by Tom Lundquist with the purpose to begin development of a Guide for large power Transformer Transportation Issues. Members were requested to joint this TF/WG for purpose of development of a scope and PAR for the next meeting in winter. The winter meeting will be used to decide upon any revision, develop a scope, and prepare a PAR.

7.3.1.6.2 TASK FORCE ON REVISION OF IEEE 62, C57.117 AND C57.125 - Wally Bender, Chairman

Red Hager introduced Wally Binder, Chair of the Task Force, who reported on the current status of the three guides being discussed.

IEEE 62 – Reaffirmation ballot is completed. Five negative ballots required recirculation of those ballots. Recirculation produced no additional negative ballots and with the promise of a revision project, four of the five withdrew their negative ballots.

- All negative ballots were regarding the use of a moisture equilibrium chart and calculation, which is part of the current C57.106. This issue is being addressed in a Working Group under the Insulating Fluids Subcommittee. Any revision of IEEE 62 will need to wait for this issue to be resolved by the experts in the Insulating Fluids Subcommittee.
- The issue is the subject of a Tutorial Presentation Session at the San Diego Meeting on Tuesday afternoon.
- The remaining comments are editorial in nature, such as updating the Standards references.
- Final paperwork must be submitted to IEEE before reaffirmation will be complete.

C57.117 – Reaffirmation ballot is completed. The vote was 100% affirmative.

- Final paperwork must be submitted to IEEE before reaffirmation will be complete.
- Editorial comments will be needed to update the Guide.
- Originally written to make reporting of failure statistics consistent, no agency is currently tracking those statistics in a public forum. Individual companies may be using the methods internally.

C57.125 - Reaffirmation ballot is completed. The vote was 100% affirmative. One negative ballot was received, but due to the editorial nature of the comments, the balloter agreed to withdraw his negative ballot.

- Final paperwork must be submitted to IEEE before reaffirmation will be complete.
- Editorial comments will be needed to update the Guide.

It has been decided at the Admin SC level to assign the IEEE 62 document to the Standards SC and the other two to the Power Transformers SC.

The structure of the revised documents was discussed. The consensus of those present was to retain the existing structure of three separate documents. One WG operating in the Power Transformers SC will work on revision of C57.117 and C57.125. One WG will operate under the Standards SC and revise IEEE 62.

Those present completed an attendance sheet indicating their interest in each guide with 13 requesting membership in the Task Forces. From this interest profile, two Task Forces will be assembled to start revision of the respective documents.

There was no further business and the Task Force adjourned at approximately 9:00 AM.

After the Task Force discussions, the West Coast Working Group meeting adjourned 8:45 AM.

7.3.1.7 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 9:35 am on March 9, 2004. There were 56 attendees comprised of 28 members, 5 requesting membership and 23 guests. The agenda for the meeting was reviewed and the Minutes from the October 7, 2003, meeting in Pittsburgh, Pennsylvania were approved.

The attendees agreed that the mission of the Task Force is to develop a functional life test and a supporting technical paper for de-energized tap changers.

The chairman presented the scope for the functional life test and reviewed his testing results presented at previous meetings.

A functional life test shall be performed as a Type Test to demonstrate the adequacy of the contact design to achieve long stable thermal life. The test consists of thermal cycling at accelerated current and temperature, with daily cool-down cycles. A successful test is completed if contact resistance remains within 25% of the original value and stability is achieved.

The test is conducted by passing twice rated current through the contacts for 8 hours per cycle at an ambient temperature of 130°C.

A total of 30 cycles (days) of the 8-hour on, 16 hour off 2X rated current are required to complete the functional test.

Transformers with high impact loading are most susceptible to thermal runaway. No tap changers failed in the field that passed this test.

The proposed paper, “Electrical Contacts for Off-Circuit Tap Changers for Oil-Immersed Transformers” by Phil Hopkinson is available on the website. Comments and co-authors are sought. Loren Wagenaar, Bill Henning, John Matthews, Mike Culhane, Dieter Dohnal, Larry Dix and Bob Degeneff were volunteered as co-authors.

The group reviewed the report on testing conducted by Dieter Dohnal or Reinhausen.

Mike Culhane and Dieter Dohnal volunteered to present additional test results at the fall meeting. Loren Wagenaar wanted to see more mineral oil examples of testing. The Chair countered that Mr. Dohnal’s work has been exclusively in mineral oil.

There was no new or old business and the meeting adjourned at 10:05 am.

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

The Working Group met at 1:45 pm on March 9, 2004 with 10 members, 7 Guests and 5 Guests that requested membership in the Working Group.

After introduction of the attendees, the minutes from the Fall 2003 meeting were approved as written.

Since the last meeting a number of comments had been received pertaining to various areas of the construction section. The entire meeting focused on getting through as many of these comments as possible.

- Section 5.1.1 (Tap Changer) – Agreed to use the DETC terminology for de-energized tap changers.
- Sections 5.1.3 and 5.1.4 (LTI, WTI) – Looking for clarification of low and high ambient light conditions. The request was to have the same requirements for analog and electronic monitors. Is it necessary to be able to read in extreme conditions (direct sun, darkness)? It’s not intended to start requiring a background light on analog devices. For low ambient conditions, a flashlight can be used to read either an analog or LCD display. Someone offered to provide suggestions on wording.
- The height of monitors was brought up and a discussion ensued regarding issues for both manufacturers and users. Lowering gauges can result in added product costs for small units. Increasing weights may result in requiring ladders be used to either read or reset gauges in the field. It was agreed to recommend the heights to be between 4 and 6 feet.
- The minimum character height on electronic displays was challenged. The WG felt that the suggestion to use a 5.55 mm as a minimum was too small and decided to stay with 13 mm for now. A user and manufacturer can agree to smaller size if preferred.
- Display requirements will not discriminate against specific colors. Black will be added to the list for both LTI and WTI.
- Static electrification may be a concern if turning pumps on when the fluid temperature is below 50°C. Therefore contact set limits should be reviewed in order to allow users to block pumps from operating. The lower set point will be changed from 65°C to level to 40°C. Need to check with device manufacturers to see if this presents any problems.
- Section 5.1.4 (WTI): Consider adding a requirement for external shorting switch if the electronic temperature monitor brings the bushing CT’s secondary directly into their unit.

Existing text for analog devices don't address this. All load monitoring CT's for thermal monitoring should be connected to a shorting type terminal block. This issue is already covered in another section (refer to section 5.15.2 for terminal block requirements).

- Section 5.3.3 (Moving Facilities): Rewrite this section such that there's a radius on the steel or an upward flange. Need to be able to roll the unit into place. The terminology for the base plate could use a better definition. A flat bottom base with material thickness of 0.5" or more must be rounded up. Also I-Beams need to have some radius. Formed bases are fine. A beveled edge can add significant cost. Skid toes can be added to I-beams.
- Section 5.7.2 (Other Oil Preservation Systems): Expand this section to include technologies for liquid preservation system for units greater than 60 MVA. Expansion tanks (conservator tank with rubber diaphragm) typically required on larger units. Also used to get shorter shipping heights. Just list the types of systems available, but don't define the requirement for a particular rating. If not specified, the manufacturer will then decide the most economical design.
- Top oil temperature range allowed for conservator system should be higher than 100°C. Normally, 110°C is acceptable. Allow up to 120°C? Decided on 110°C.
- Eliminate Gas-Liquid seal system?
- What to do with Free-Breathing systems? Some people still build.
- Need someone to address conservator tanks with and without bladders also the accessories and size this applies to. Javier Arteaga and Tom Lundquist will put something together and circulate for comments.

At the end of the meeting, everyone was asked to review the remaining comments that were distributed and to offer comments. The meeting adjourned at 3:00 pm.

7.3.1.9 WORKING GROUP ON THE APPLICATION OF ON-LINE MONITORING TO LIQUID IMMERSSED TRANSFORMERS AND COMPONENTS- Donald Chu and Andre Lux, Co-Chairpersons

The Working Group met on Tuesday, March 9. Sixty-two members and guests were in attendance.

Draft 12 of the Guide was discussed. The Guide has to go through a significant amount of changes. A number of these changes were discussed during the meeting. Issues discussed and actions taken include:

Removal of the following sections

- Section 3.10, Load Tap Changer (LTC) Operations. This information is contained in an earlier section
- Annex 1 – Bushing Power Factor and Capacitance
- Annex 2 – Partial Discharge
- Annex 3 – Winding Temperature Measurements

A number of members volunteered to review key sections. The working group co-chairmen will contact additional monitoring equipment vendors and request that they also review key sections

The decision was made to significantly reduce the amount of text in Section 4. The sections regarding communications and communication protocols have to be reduced or edited significantly.

Discussion took place regarding the amount of information that is required in benefits and risk assessment methodology. Some of the existing information may be removed.

Discussion also took place regarding the necessity of having existing tables in the appendix that were taken from a CEA published report on On-Line Monitoring. One of the members volunteered to review the tables in the Annex and compare these to tables throughout the Guide.

A group of approximately six Working Group members will meet at the upcoming Doble Conference for the purpose of going through the Guide carefully and making as many of the necessary changes as possible.

7.3.1.10 TF/WG Revision of C57.135 – Tom Lundquist, Chairman

The meeting was called to order at 9:30 am with 26 in attendance including 21 members signed up as members of TF/WG

It was announced a Task Force (TF) is being formed to evaluate the need to conduct a revision of C57.135. Attendees were asked to review the document and submit to the chair those suggestions for change to the guide. Accumulation of the suggestions will be circulated to the members for comment. The winter meeting will be used to decide upon any revision, develop a scope, and prepare a PAR.

The meeting adjourned at 10:00 am.

7.3.2 Old Business

Red Hager reported on the meeting of the IEEE 693 Working Group in San Diego last fall and the tutorial presentation at this meeting on seismic transformer design considerations.

7.3.3 New Business

Tom Prevost discussed the need for all groups working on Guides and Standards to review C57.12.80 to ensure consistency with Terms and Definitions.

Red Hager also reported that, following this meeting, he will submit a request to the Administrative Subcommittee requesting Tom Lundquist to serve as the Subcommittee Chair and Red Hager to then serve as Co-Chair.

The meeting adjourned at 2:45 pm.

7.4 Underground Transformers & Network Protectors – Carl G. Niemann Chair

Meeting Minutes – San Diego, California

7.4.1 Introduction/Attendance

The Underground Transformers and Network Protectors Subcommittee met on Wednesday, March 10, 2004, in the Boardroom E/W room of the Catamaran Resort Hotel at 9:30 AM with eleven members and five guests present.

7.4.2 Approval of Minutes

The minutes of the October 8,, 2003 meeting in Pittsburgh, Pennsylvania were approved as submitted.

7.4.3 Membership

Membership stands at 20 members.

7.4.4 Chairman's Remarks

Administrative Subcommittee Notes Reported to SC

- The Chair reported that the AdCom SC had approved the transfer of C57.12.23 (Shingle Phase Underground Transformers) from Distribution Transformers SC to this SC..
- The subcommittee was informed that IEEE had Approved a new Stabilized Standard category where we can place C57.12.57. I can remain there inactive without being withdrawn and can always be revised at a later date if a necessity arises.

7.4.5 Working Group Reports

7.4.5.1 Three-Phase Underground-Type Transformers (C57.12.24) Giuseppe Termini Chairman

1. Met on Monday, March 8, 2004, at 9:30 AM in the Boardroom East with ten members and seven guests present.
2. Minutes of the October 6, 2003 meeting in Pittsburgh were approved.
3. John Sullivan announced his intensions to step down after the next meeting and turned the meeting over to Giuseppe Termini.
4. Discussions under old business centered around; fin metal thickness; tank material thickness and coating material; and, construction requirements for wet verses dry locations..
5. Brian Klaponski recommended a review of dimensions related to Dwg. 7.1.5. He would like to see clearance requirements more in line with the pad mounted requirement.
6. Dan Mulkey recommended referencing C57.12.28 for dry locations and C57.12.29 for wet locations. He also pointed out the need for an active PAR.
7. Paul Orehek recommended a complete review of the standard.
8. The meeting was adjourned at 10:12 AM.

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

1. Met on Monday, March 8, 2004 at 3:15 PM with 14 members and five guests present.
2. Minutes of the October 6, 2003 meeting in Pittsburgh were approved as submitted.
3. The Chairman distributed copies of Draft 1 of C57.12.40 to the members.
4. There was discussion on the Draft and Stan Kostyal and Steve Schroeder volunteered to cross check the metric conversions in Table 9 and in the drawings. Dan Mulkey will get them a copy of the ‘official’ metric conversion spreadsheet.
5. Brian will communicate with the IEEE editorial staff to get a preballot editorial review. When complete the standard will be balloted ASAP.
6. In discussion on the next revision questions arose regarding the network switch requirements. A task force consisting of Larry Dix, Steve Schroeder, Iqbal Hussain, and Joe Cultrera was set up to review the requirements and report back prior to the next meeting.
7. The meeting was adjourned at 4:15 PM.

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

1. Met on Monday, March 8, 2004 at 1:45 PM with nine members and two guests present.
2. Minutes of the October 6, 2003 meeting in Pittsburgh, Pennsylvania were approved as written.
3. Discussion centered on:
 - (iii) Reviewed Clause 5.2.5 provided by Jock Moffat. Minor modifications were made.
 - 77 5.2.5 – “phase to phase” changed to “three phase”.
 - 78 5.2.5.2 – “fuse let-thru” changed to “fuse peak let-thru”; last line was dropped.
 - 79 5.2.5.3 – drop last bullet item and renumber items.
 - (iv) Reviewed pre-ballot editorial comments:
 1. .28, .32, .40, and C37.108 will remain in Clause 2. The remainder will be moved to a reference annex. Mulkey will review and update, if appropriate, dates of the remaining references. Moffat will research titles of ASTM 495, D229, UL746A, and UL94. They will be added to the reference annex.
 2. Mulkey will insert editors suggested phrase about referring to IEEE 100 at start of Clause 3.

3. 3.1.3 – replace “the removable breaker” with “an assembly that”.

(v) Under New Business – Mulkey will end finished draft to members and guests for a quick final review before submitting it to balloting.

4. Request one session for next meeting.

5. Meeting adjourned at 2:44 PM

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

No report, Chairman not in attendance. Working Group discussed moving this to new category

7.4.5.5 Underground Single Phase transformers (C57.12.23) A. Traut - Chairman

These minutes will be added after next meeting.

7.4.6 New Business

Dan Mulkey informed the SC that C57.12.80 was being revitalized. This standard is for definitions used in standards.

7.4.7 Future Meetings

The location and dates for future meetings are as follows:

October 24-28, 2004 Las Vegas, Nevada

Spring 2005 Jackson, Mississippi

7.4.8 The Subcommittee adjourned at 10:45 AM.

7.5 Audible Sound & Vibration – Jeewan L. Puri Chair

1. Audible noise & vibrations S.C. met on March 10, 2004 at 8:00 AM with 12 members and 7 guests present. Bill Darovney served as acting chair.

2. The minutes of the Pittsburgh PA meeting were reviewed and approved.

3. WG Report:

3.1. Bill Darovny acting Chairman of the TF for writing “Sound Level Measurement Guide” reported that the guide is at Draft 2 and that 8 new editorial comments were received at the meeting. Clauses to be added to the guide are ‘narrow band measurements’ and ‘practical

aspects of making sound level measurements'. These will be based on IEC 60076-10 with changes made to suit the North American environment.

3.2. Bill Darovny gave a presentation on narrow band measurements as documented in IEC 60076-10-1 clause 5.4. Comments for improvements to the narrow band section were:

3.2.1. In the 3rd paragraph, reference to 1/12 octave is incorrect and should be 1/10 octave.

3.2.2. Narrow band measurements should be on the C scale rather than A scale.

3.2.3. Add typical narrow band A scale and C scale spectrum graphs for a 60 Hz transformer (IEC has a 50 Hz A scale spectrum). The intent of showing both scales is for user reference. Mr. Girgis will provide this information.

3.2.4. Mr. Kennedy offered to provide an example of narrow band measurements taken at site where the user was interested in segregating the transformer noise from that of other equipment.

3.2.5. Table x – 'Values Of A Weighting As A Function Of Frequency' should be specific to the transformer frequencies (ie 120, 240, 360 ...Hz) rather than of the ranges shown. Mr. Girgis will provide this information.

3.2.6. It was commented that EPRI did some work on narrow band measurements some years ago and information may be available.

4. Standard Sound Level Tables:

4.1. The major topic discussed was Jeewan Puri's proposal to create new sound level tables that could eventually be used in C57.12.00 and C57.12.01. These are based on NEMA TR1 tables and a progression analysis based on equations developed by Jeewan. Copies of the theory and proposed tables had been sent to all SC members for comments.

4.2. In summary, the proposal extends the tables for kVA ranges currently not covered and also alters some of the existing TR1 values. For dry type transformers, some of the dB levels would rise 1 to 5 dB and for liquid filled transformers some would decrease by 1 dB.

4.3. Six written comments were reviewed at the SC meeting. The responses ranged from 'make no changes to the TR1 tables' to 'extend the tables but do not change the existing values'. There were no comments accepting the proposal.

4.4. Verbal concerns to Jeewan's proposal were:

- 4.4.1. There is no need to create a new equation to extend the tables, as the origin of the NEMA TR1 table is known. This equation is available in the public domain; see Standard Handbook for Electrical Engineers, 12th edition, McGraw-Hill, section 10, "Transformers" by W.J.McNutt, paragraph 94, equation 10-58.
- 4.4.2. One manufacturer has published values for kVA ranges currently not covered. These should be compared to the Puri and McNutt values.
- 4.4.3. In extending the tables, eliminate the values proposed for impractical transformer ratings.
- 4.4.4. Keep the existing TR1 values because changing them would confuse the user. The TR1 reference has been in use for many decades and is a stable baseline.
- 4.4.5. Keep the existing TR1 values because some users specify Sound Level in terms of the NEMA TR1 value minus X dB. Changing the baseline would create confusion.
- 4.4.6. The TR1 values represent a baseline for users and they are always able to specify lower values when required for their application.
- 4.4.7. In Europe, there are several different SL tables based local and National requirements. The TR1 table is considered the North American baseline.
- 4.4.8. Why are the proposed values different in the dry type and oil filled tables?
- 4.4.9. There is a need of a paragraph on how to interpret the tables.
- 4.4.10. It was suggested that the table heading should say 'typical' so as not to confuse the user.
- 4.4.11. Load noise is not addressed. Load noise is more commonly specified in Europe and we should consider adding it to the document.
- 4.4.12. Need to correct the terminology for the forced cooled ratings.
- 4.4.13. We were informed that NEMA committee plans to review ST-20 and ST-1 and the status of the TR1 sound level table will be discussed.

5. The SC meeting adjourned at 9:15 AM.

Bill Darovny, March 13, 2004

7.6 Bushing SC – Fred E. Elliott Chair

7.6.1 Introduction/Attendance

Chairman, Fred Elliott opened the meeting at 3:00 PM and welcomed the members and guests. There were 35 attendees with 15 members and 20 guests present. Two guests requested membership to the Bushing Subcommittee.

7.6.2 Approval of Minutes of Last Meeting

The minutes were approved as written.

7.6.3 Chairman's Remarks

The Chair made the following remarks after attending the Administrative Subcommittee.

- The Fall 2004 Transformer Committee meeting is expected to be held in Las Vegas, NV. Details to follow.
- The Spring 2005 Transformer Committee meeting will be held in Jackson, MS
- Transformer committee meeting format was discussed and is expected to stay at 3.5 days. Thursday meeting will be more efficient. All the reports should be short and to the point

In addition, the Chair informed that P. Singh has expressed a desire to handover the job of Secretary to an interested member. Bushing subcommittee members interested in taking over this responsibility can either contact Fred Elliott (Chair) or P. Singh (Secretary) of the Bushing Subcommittee.

7.6.4 Working Group and Task Force Reports

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

Because of negative ballots, Draft 6 will be recirculated.

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

The TF Chair opened the meeting at 11:00 AM and welcomed members and guests. There were 38 attendees with 20 members and 18 guests. Three guests requested for membership.

The agenda was reviewed and the following items were discussed for the proposed revisions to the document.

- P. Singh's proposal on draw lead guidelines was discussed and it was decided to have separate guidelines on draw lead cables and draw rod conductors. P. Singh agreed to revise the draw lead proposal to add cable related information on overload time and temperature limits. Keith Ellis agreed to write new guidelines on draw rod conductors that carry current.
- It was decided that the section on temperature calculations for short time overloads should remain unchanged for now.
- C. Monoski's proposal on bushing repair was discussed and it was decided to break the section into two sections. One on porcelain bushings and the other on composite bushings with silicone insulators. It was agreed to add information on type of insulator damage/repair and terminal

overheating/threaded connections etc.

- It was agreed to add a section on-line monitoring. Information will be available for discussion at the next meeting.
- The subject of sampling oil for DGA analysis was again discussed at this meeting. Because of the concern about opening the bushing and possible oil contamination, it was decided not to include any guidelines in the Application Guide.

7.6.4.3 Bulk Bushings – Bob Hartgrove Chair

Bob Hartgrove reported that the meeting on Bulk Bushings TF was held on March 9, 2004. There were 33 attendees out of which, 16 requested membership to the TF. The following were reported.

- Discussed the purpose of TF and then identified the types and range of bushings to standardize.
- The group decided that the definition in C57.19.00 would be used for Bulk Bushings.
- The group voted not to work on GSU high current bushings but recommended to create a new TF to standardize these, because they are both solid and capacitance graded.
- The group decided to work on 1.5 kV through 46 kV bushings with current ratings up through 6000A.
- H-J Enterprises and Warco agreed to provide a list of their most popular bushings with dimensions as a starting point.
- Meeting was adjourned at 4:15 PM

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

7.6.4.4.1 Bushings for DC Applications – SG26A WG4 / IEC 62199 - Proj. Leader: Gilles Desilet, TransEnergie, Canada

A final draft (36A/117/FDIS) is in circulation with final date for comments being the end of March 2004. This standard is very similar to IEEE Std. C57.19.03 – 1996. This draft includes the following changes:

- No DC tests on bushings rated 150 kV and below.
- Discussions on possible conditioning prior to withstand test in order to avoid test tank oil related particle contaminants, reached a compromise. The voltage can be raised to transformer test level (100 %) in one minute and then to bushing test level (115 %) in the next minute. Maximum number of partial discharge pulses greater than 2000 pC is 10 (from 7).

This standard will be published before the end of 2004

7.6.4.4.2 Insulated Bushings for Alternating Voltages above 1 kV – SC36A MT5 / IEC 60137 – Proj. Leader: John Graham, Trench, UK

- This standard (IEC 60137) was published in August of 2003. However, due to comments received from the IEC Transformer committee TC14, work was immediately started to resolve the issues. The comments were based on the difference between the tests on bushings and the latest requirements in IEC 60076-3. The new MT has held two meetings.

- Some compromises have been reached to increase the voltage class range for routine impulse tests. For transformer bushings in the lightning impulse range 380 kVp to 850 kVp, full wave and chopped wave lightning will be included as type test (based on testing of three bushings to increase the statistical margin/security). A new AC long duration type test has been added for transformer bushings equal to and above 170 kV rating. In addition, an EMC test has been added for all bushings above 123 kV rating
- The altitude correction factors have been revised following the procedures given in IEC 60694 and IEC 60071-1 (switchgear and other equipment standards). The correction factor k is based on altitude above 1000m with different corrections for impulse, power frequency, and switching impulse voltages. The change gives higher correction factor than the present 1 % per 100 m. For example, the correction factor at 3000 m becomes 1.28 instead of 1.2.
- In addition, several clauses have been added on handling, safety, and environment following the IEC Guide 111 (Equipment in high voltage substations).

A committee draft (CD) will be issued for National comments by the end of March 2004 for discussions in Seoul.

7.6.4.4.3 Seismic Qualification of Bushings – SC36A MT7 / IEC 61463

A new revision team will be set up to review the 1997 standard. This standard offers a more simplified approach to qualification than IEEE Std. 693, allowing static calculations. No work yet.

7.6.4.4.4 Capacitance Graded Bushings 52 to 420 kV for Oil filled Transformers – CENELEC TC36A WG4

CENELEC is the European equivalent of IEC and produces standards or harmonization documents for use in European Community. As standards, they have a legal status and override similar standards in member states. This document will standardize on dimensions. Efforts are being made to reach a compromise between the utilities and the manufacturers. Agreement has been difficult to achieve and the document is now at draft 15. The latest draft will go to the National Committees in April of 2004.

7.6.5 Old Business

7.6.5.1 Bushing Monitoring Devices

The Chair was contacted by U.S. Bureau of Reclamation regarding bushing monitoring devices. It is not clear whether this belongs in bushing subcommittee or instrument transformer subcommittee. Comments from bushing subcommittee members were requested. Chair will explore this further by contacting the instrument transformer committee Chair. Further discussions are expected at the next meeting.

7.6.5.2 Bushing Tutorial

As an extension to information presented by Keith Ellis at the Doble Seminar (Life of a Transformer), it was agreed to have a bushing tutorial at the spring 2005 transformer committee meetings. The following members volunteered to participate.

L. Wagenaar, M. Rivers, C. Monoski, K. Ellis, and P. Singh

7.6.6 New Business

John Graham made a comment about CIGRE. They are setting up a new group on Bushing Reliability. The Chair offered to find more information about this group's activity.

7.6.7 Adjournment

The meeting was adjourned at 3:35 PM.

Note: Information on Bulk Bushings activity was added on August 10, 2004.

7.7 Dry Type Transformers SC – Charles W. Johnson, Chair

7.7.1 Introductions and Approval of Minutes

The Dry Type Transformer Subcommittee met in San Diego at the Catamaran Resort Hotel at 1:30 PM on March 10, 2004 with 17 members and 6 guests present; 2 guests requested membership. Minutes from the October 8, 2003 meeting were reviewed and approved.

7.7.2 Working Group Reports

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

7.7.2.1 WG Dry Type General Requirements C57.12.01 - Chairman John Sullivan

The working group met in the Boardroom East of the Catamaran Resort Hotel.

Chairman John Sullivan called the meeting to order at 1:45 PM on Monday October 8, 2004 with eleven (11) members and six (6) guests present.

Introductions were made.

The Pittsburgh meeting minutes were approved.

The current status of the C57.12.01 standard was discussed:

- The working Group was granted a PAR extension to 31 December 2005.
- During the first week of April 2004:
 - a. The Standard will be sent to the IEEE editorial staff for review.
 - b. At the same time the standard will be circulated to W.G. members for review.
- Corrections will be made and the Standard submitted for ballot.

E-mail is still a problem. During the last mail out some address still were not correct and some e-mail was not accepted for "policy reasons".

Without a valid working e-mail address members will not receive review copies of the standard. Also, members need to provide the IEEE Balloting Pool with a valid working e-mail address to receive ballot information. The Ballot Pool web site is:

<http://standards.ieee.org/db/balloting/ballotform.html>

There being no further business, the meeting was adjourned.

7.7.2.2 Dry Type Reactor TF - Chairman Richard Dudley

The Dry Type Reactors T.F. met in the Boardroom East of the Catamaran Resort Hotel in San Diego, CA on Mar. 8, 2004 at 8:00 a.m. There were 7 members and 4 guests present. Two of the guests requested membership. The following are the highlights of the meeting.

1. IEEE C57.16-1996 (R2001) will be up for Reaffirmation or Revision in 2006. The Dry Type Reactor T.F. became a W.G. in 1990 to produce the current version of C57.16 and continues to monitor the document re possible future changes or revisions. Possible future revisions were discussed as follows.
 - (i) Filter reactors may employ taps. In some cases, especially filter reactors used in conjunction with HVDC, the tap step size is within the accuracy tolerance of the bridge or electronic wattmeter used to measure losses and inductance (reactance). T.F. members reached a consensus that it was reasonable to measure the inductance in steps of sufficient size (for example 1%) to provide good measurement resolution; 3 or more points. The results could then be used to generate a graph of inductance for the tapping range. The Chairman, Richard Dudley, agreed to produce a draft proposal for inclusion in the test code in the annex to C57.16 covering filter reactors.

- (ii) The T.F. felt that an informative annex should be added to C57.16 covering circuit breaker TRV issues associated with the application of series reactors; distribution class and transmission class. Pierre Riffon mentioned that an IEC W.G. had produced a draft document on TRV issues associated with circuit breakers used with series reactors; IEC 17A/686/CD. The document will be an amendment to the IEC circuit breaker standard. Pierre Riffon will provide a copy of the draft document as a reference for T.F. members. Note that IEEE Switchgear Committee members were involved in the work and the IEEE Switchgear Committee may adopt the document. One of the major recommendations in the IEC document is that capacitors across the reactor or to ground can modify the TRV of the CB. The Chairman, Richard Dudley, agreed to produce a draft informative annex, as a proposed revision to IEEE C57.16, describing the reaction/circuit breaker TRV phenomenon and mitigation.

 - (iii) The option of compensated or non-compensated 3 phase stacked current limiting reactors (CLRs) was discussed. If 3 phase stacked CLRs are compensated (equal impedances including the effect of coupling) then in the case of single phase to ground faults, fault current limiting is not the same in all 3 phases. In the case of a 3-phase fault, fault current limiting is the same in all 3 phases and this is important for current breaker performance. Pierre Riffon and Paulette Payne felt the wording of Clause 7.2.5 was adequate as is.

 - (iv) Table 5 covering dielectric test levels etc. should be reviewed and modified to reflect current practice. Table 5 in C57.21, the shunt reactor standard, is in the process of being modified and will be used as a starting point. Focus will be on BIL levels versus system voltage class. Some BIL levels are no longer used and others are inadequate. Exceptions, including much-reduced BILs, will be addressed in a note. Work under way re the revision of similar tables in the power transformer standard will be taken into consideration. Pierre Riffon agreed to produce a draft revision for Table 5.

 - (v) Discussion took place on the subject of BIL across the reactor vs to ground and whether this should be covered in a note. Tony Weekes pointed out that a note to Table 5 in the current version of C57.16 covers this subject. Is the note sufficient? Input from T.F. members is requested.
2. Discussion took place re the current revision process for IEEE Std. 32-1972 (now IEEE C57.32) and the support to the W.G. to be provided by the Dry Type Reactor T.F. This standard covers neutral grounding devices; including neutral grounding reactors and Peterson coils (resonant neutral grounding). The Dry Type Reactor T.F. provided input to the revision process when the document was under the jurisdiction of the IEEE Protective Devices Committee. The T.F. will continue to support the revision process and provide input on reactors to the W.G. chaired by Steve Schappell. Pierre Riffon asked the question if neutral grounding reactors should be included in C57.16. Another option is for C57.32 to refer to C57.16 re the test code for neutral grounding reactors. One role of the T.F. could be to ensure that the test code for C57.32 properly reflects the design aspects of the various neutral

grounding devices. One big difference between reactors and resistors, for instance, is short circuit withstand. Design focus for neutral grounding resistors is thermal and for neutral grounding capacitors it is voltage. The Dry Type Reactor T.F. will continue to provide input to the W.G. for the revision of IEEE Std. 32 (now IEEE C57.32). Test code for the various devices is the major challenge and adequate consistency is the issue.

3. The T.F. briefly discussed resistors used in filters. What standard covers resistors for this application? Should they be included in some format in the annex of C57.16 covering filter reactors?

The meeting adjourned at 9:15 a.m. The Chairman stated that the issue of resistors used as part of filters would be brought to the attention of the Transformers Committee re action, if any.

7.7.2.3 WG Dry Type Thermal Evaluation C57.12.56/60 - Chairman Richard Provost

The working group met in San Diego, CA at the Catamaran Resort Hotel at 9:30 AM on Tuesday, March 9, 2004 with eight members and ten guests present. Three guests requested membership in the working group, and they are welcome.

The Chair reviewed the minutes from the last meeting which were approved as read. The chair next reviewed the Title and Scope of the document which was used for the PAR submission. The PAR was approved at the December 10, 2003 Standards Meeting.

The Title of the document will be: “IEEE Standard Test Procedure for Thermal Evaluation of Insulation Systems for Dry Type Power and Distribution Transformers, Including Ventilated, Solid-Cast and Resin Encapsulated Transformers”.

The Scope of the PAR will be worded as follows: This Test Procedure is for the thermal evaluation of insulation systems of dry type power and distribution transformers, including both ventilated technology and solid-cast / encapsulated technology, to be used for determining the temperature classification of the insulation systems.

The Chair then thanked the members of a task force who provided valuable input into the creation of a combined draft document for the combining of IEEE C57.12.56 and IEEE C57.12.60. These members were Derek Foster, Jeewan Puri, Bill Simpson, Rick Marek, Roger Wicks and Dick Provost.

The Chair then discussed a number of issues related to the combined document which came up during the development of the draft document. A summary of these issues will be circulated to members of the working group. The issues discussed will be outlined in turn.

Should the document be a guide or a standard (56 is a standard, 60 a guide). This led to discussion related to what is needed to be a standard (typically a lot of data/experience). The chair will discuss this with IEEE to determine how we should proceed. This then led to a solicitation for data from members of the working group and Ken McKinney volunteered to help coordinate collection of this information.

During a discussion on the various sections, it became apparent that better “definitions” of the equipment types are needed for the combined document, and that within this definition there should be a listing of the various technologies used to produce each type so as to not limit the scope covered. Martin Navarro agreed to provide a draft definition which the chair agreed to incorporate into the draft document which will be circulated to members of the working group.

The Chair then discussed winding type specifications for the models which raised a substantial amount of discussion. It was generally agreed that this was a good upgrade, and that the specifics of the wire sizes/configurations would be part of the draft document which would be commented on by members of the working group as a part of their review.

The review of the draft document in the meeting covered sections up through and including Clause 4.2, and it is expected that the remainder of the document will be reviewed during the next meeting along with any additional comments developed during the circulation of the new draft.

New Business – Rick Marek raised a question to the floor regarding the overall design of the test coils relative to the low voltage and high-low barrier portions of the transformers and how they need to be tested, since the existing documents and this current draft document deal with the aging and testing of the high voltage windings. The Chair raised the further question regarding a number of issues which have come up due to the combination of the two documents, which led to a question regarding the viability of combining these two documents.

The Chair agreed to circulate a questionnaire along with the draft document to the working group members to solicit comments related to these issues.

There being no other new business, the working group adjourned at 10:45 AM

7.7.2.4 WG Dry Type Test Code C57.12.91 - Chairman Derek Foster

- 1 The working group met at 1:45 pm with 11 members and 7 guests present.
- 2 After introductions the minutes from the October 7, 2003 meeting in Pittsburgh were approved as written.

3 Old Business

The Chairman led a discussion of the various clauses of the standard objected to by Nigel McQuin during the last ballot. Nigel McQuin was not present for the meeting, neither was Max Cambre who provided a very thorough review of Nigel's objections prior to the meeting in Raleigh, in the spring of 2003. Joe Cultrera and Jerry Murphy provided written reviews of the clauses on resistance measurements. Jerry Murphy and Patrick Epping provided written reviews of clauses on dielectric tests. The Chairman provided a compiled listing of the comments from the volunteers. The meeting consisted of reviewing these comments by clause numbers.

It was suggested that a par be initiated for a complete review of the standard prior to the expiration date of the standard; i.e., Jan 2006. Eight of the 18 persons present were in favor of a complete review of the document as opposed to a corrigenda, which would address only certain clauses.

The following clauses were reviewed during the meeting:

5.4.1	5.4.2	5.4.2.1	5.4.2.2	5.4.2.3	5.4.2.4
5.4.2.5	10.2	10.8.2	10.8.3		

Clauses 10.9.4 b), 11.2, 11.3, 11.5, and 11.8.6 were not reviewed for lack of time.

The Chairman will provide a document for review by the members of the working group before the next meeting, which will incorporate the changes proposed by Mr. McQuin as summarized by the Chairman. A vote, at or before the next meeting, will determine if these changes should be incorporated in the document. When it is determined which, if any, of Nigel McQuin's objections the working group wishes to incorporate into the standard, the working group will be in a better position to decide if a complete revision or a corrigenda is more appropriate.

There being no new business, the meeting was adjourned at 3:05 pm.

7.7.3 Administrative

If a standard is at the end of life, either reaffirm or take out a PAR. The Standards Board will extend the life of the standard to the end of the PAR.

7.7.4 New Business

- 1 C57.12.50/51/52 and 55 have been transferred from NEMA to IEEE effective December 2, 2002. The Subcommittee has 5 years from the transfer date to revise the standards as there is no reaffirmation process. Only a PDF version of the documents is available for revision. Discussion ensued on the problems when documents are scanned then converted to PDF requiring retyping the entire document and errors in electronic standards received from IEEE due to software conversions. It was questioned why IEEE could not provide the standards in WORD format and noted that the Transformer Committee now has several representatives on the Standards Board who are aware of and will address the issue.
- 2 C57.96 Loading Guide was reaffirmed February 2004.
- 3 IEEE 259 Evaluation of Insulation Systems for Specialty Transformers ballot approved the reaffirmation.
- 4 There being no further business, the subcommittee meeting adjourned at 2:15 PM.

7.8 Distribution Transformers – James E. (Ed) Smith, Chair (edsmith@h-jenterprises.com)

7.8.1 Meeting Time:

Attendance: 46 Total

27 Members

19 Guests

2 Guest Requesting Memberships

7.8.2 Chair's Remarks & Announcements:

Review of Administrative Committee meeting highlights

- Future Meetings
- New Members
- Transformer Standards Activity

7.8.2.1 Working Group Reports

7.8.2.2 C57.12.20 Overhead Distribution Transformers

(Alan Wilks & Tommy Cooper Co Chairs

(awilks@ermco-eci.com & Tommy.cooper@faypwc.com)

PAR Status: Current

PAR Expiration Date: 12/31/ 2005

Current Standard Date: 1997

Current Draft Being Worked On: 10b Dated: January, 2004

Meeting Time: 09:30am, Monday, March 8, 2004

Attendance: 33 Total

18 Members

15 Guests

1 Request for membership

Issues, Remarks & Announcements:

“Draft 10b will go out for ballot in the near future”

The meeting was called to order by Alan Wilkes at 9:30. Introductions were made and the attendance roster was circulated. There were 18 members and 15 guests present. One guest, Steve Hudson requested membership. The minutes from the meeting in Pittsburg, Pa were reviewed and approved. We went over 9 editorial changes in Draft 10b recommended by a review of IEEE’S pre-ballot Review Editor. A balloting group of 78 has been formed and Draft 10b will be balloted soon. We also went over some future changes to 10b. One of which we decided was an additional editorial change Section 7. from reading a tolerance of “2mm(0.063inch)” to ” $\pm 2\text{mm}(\pm 0.063\text{inch})$ ”. Alan plans to incorporate this editorial into Draft 10b if possible. All of Section 7 and Section 9 will be renumbered. In Sections 7.2.5.1 and 7.4 we decided to remove the reference to C57.91 since it did not apply and to remove it from the Section 2 also. Alan is to check with manufacturers of PRDs to verify that they can meet pressure from -40 to 140° C. Change Section 7.2 to read “may be provided and shall be located as shown in Figures 7 – 14”, this is to be researched by Tim Olson to see if we need to add ballooning to these figures for our next meeting. In Section 8.2 the reference of angle of tilt shall remain an agreement between the user and the manufacturer. In Section 9.3 we need to change reference to “9.6” to “9.5”. In 9.4.1 the last sentence should read “shall not” instead of “cannot”. In Section 9.5.2 in the next to last 2 sentences should read “ This fault shall draw 25 times the rated transformer current up to a 4% transformer impedance. For impedances greater than 4% the current will be limited by the transformer impedance.” Alan assigned Tommy to attend SC for Dielectric Tests on Wednesday to see if they cover our Section 6.2 about applied voltage test to a single bushing transformer with H2 permanently grounded. Alan reminded everyone to make sure that they are in the balloting group for C57.12.20 D10b. The meeting was adjourned at 10:45.

7.8.2.2.1 C57.12.23 Single Phase Submersible Distribution Transformers

Al Traut & Bikash Basu Co Chairs

(alant@kuhlman.com & basub@sce.com)

PAR Status: Approved N/A

PAR Expiration Date: N/A

Current Standard Date: 6/13/2002,

Current Draft Being Worked On: N/A

Meeting Time: N/A

Attendance: 19 Total

6 Members

13 Guests

8 Request for membership

Issues, Remarks & Announcements:

The WG met with 13 members or requesting membership and 5 guests as shown in the attached list.

Minutes of the Fall 2000 meeting in Niagara Falls were approved as submitted.

The chair reported that this WG will be transferred from the Distribution Subcommittee to the Underground Subcommittee effective with the Fall 2004 meeting. This is being done to provide relief to the growing number of WGs in the Distribution Subcommittee and to have all Underground Transformer Standards under the umbrella of the Underground Transformer Subcommittee.

The WG will recommend to the Underground Subcommittee that this WG be placed in the 8am Monday time slot to allow interested Distribution SC members the opportunity to attend this WG without conflicting with other Distribution WG meetings.

In Clause 1.1 the term “suitable for occasional submerged operation” was reviewed in attempt to more clearly define what is meant by occasional. The WG voted 12 to 1 to remove the word occasional from that sentence in 1.1 and add a definition for submerged operation to the definitions of this document. Dan Mulkey, Guiseppe Termini, and Al Traut will work on this definition and provide a recommendation for the next meeting.

In Clause 1.1 the term “mineral-oil-immersed” will be replaced with “liquid immersed”. This will be incorporated throughout the document as needed.

A request to add 50Hz transformers to the scope of this standard failed 13-0.

In Table 2 the recommendation to add 480/240 with 3 terminals passed 11 to 2.

A recommendation was made to swap the location of the parking stands and the nameplate in Fig 1. This failed 13 to 0.

In Fig 2 the 0.56 inch hole dimension will be changed to 9/16 inch. This is consistent with the guide for metrification C57.144.

7.8.2.2.2 C57.12.25 Single-Phase Padmounted Distribution Transformers

Ali Ghafourian & Ignacio Ares Co Chairs

(aghafourian@ermco-eci.com & Ignacio_ares@fpl.com)

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

PAR expiration Date: End of 2004

Current Standard Date: 1990

Current Draft Being Worked on: #5, Dated: March 2004

Meeting Time: 11:00am, Monday, March 8, 2004

Attendance: 54 Total

Issues, Remarks & Announcements:

Minutes of Pittsburgh's meeting were approved.

Status of draft 8 of C57.12.25 was reviewed. This draft is in process of re-circulation.

Copies of draft 5 of combined C57.12.21 & .25 were distributed to the working group for review.

Changes from D4 to D5 were discussed.

The major change is addition of delta H.V. ratings to standard.

Item 7.2 " Dielectric Test" will need to be changed to include delta ratings similar to C57.12.20.

Document #: C57.12.21 & C57.12.25 Draft Revision: _D5_ Date: 3/2004

Table 1 – Delete note "b" & change "c" to "b".

Fig. 3 - Extend the dimension lines to HV bushing.

Change H1A to H1

Remove note 3 & change 4 & 5 to 3 & 4.

Table 2 – Ken Hanus & Mike Culhane agreed to add delta H.V. ratings to table 2.

Fig. 4 – Change note 6 to show ± 2 mm ($\pm .063$ inches).

Change 0.625-11 to 5/8-11.

Fig. 5 – Change front panel to include L.V. bushings.

Relocate parking stand to be on the outside of HV bushing. Tom Holyfield agreed to send me drawings.

Change H.V. bushing height to be 23" for the lower bushing per Mike Culhane request.

(Note: After W.G. meeting Mike agreed to leave this dimension as is.)

9.2.5 Change statement to include delta ratings.

11.1 Al Trout & Dan Mulky volunteered to review the top oil temp. range of -5° to 105° for a sealed tank construction.

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

7.8.2.2.4 C57.12.28 Pad-Mounted Equipment Enclosure Integrity

Bob Olen & Dan Mulkey Co Chairs

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

PAR Status: Approved

PAR expiration Date: May 09, 2007

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: D 1.7 Dated: 11/14/2003

Meeting Time: March 9, 2004 Time: 8:00 AM

Attendance: 46 Total

20 Members

24 Guests

2 Guest Requesting Memberships

Issues, Remarks & Announcements:

A few very minor corrects were made to numerical values and spelling errors.

C57.12.28 draft 1.7 will be sent to IEEE for balloting during April 2004.

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

Bob Olen & Dan Mulkey Co Chairs

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

PAR Status: Approved by NES Com May 23, 2002

PAR expiration Date: May 09, 2007

Current Standard Date: ANSI/NEMA 1999

Current Draft Being Worked on: 1.2 Dated: November 14, 2003

Meeting Time: March 9, 2004 Time: 8:00 AM

Attendance: 46 Total

20 Members

26 Guests

2 Guest Requesting Memberships

Issues, Remarks & Announcements:

A few very minor corrects were made to numerical values and spelling errors.

C57.12.29 draft 1.2 will be sent to IEEE for balloting during April 2004.

7.8.2.2.6 C57.12.31 Pole Mounted Equipment Enclosure Integrity

Bob Olen & Dan Mulkey Co Chairs

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

PAR Status: Approved by NESCOM N/A

PAR expiration Date: N/A

Current Standard Date: 2002 Published March 7, 2003

Current Draft Being Worked on: Dated :

Meeting Times: ***DID NOT MEET***

7.8.2.2.7 C57.12.32 Submersible Equipment Enclosure Integrity

Bob Olen & Dan Mulkey Co Chairs

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

PAR Status: Approved by NESCOM N/A

PAR expiration Date: N/A

Current Standard Date: 2002 Published March 7, 2003

Current Draft Being Worked on: Dated :

Meeting Times: ***DID NOT MEET***

7.8.2.2.8 C57.12.33 Guide For Distribution Transformer Loss Evaluation

Don Duckett & Tom Pekarek Co Chairs

(don.duckett@fpc.com & tjpekarek@firstenergycorp.com)

PAR Status: PAR extension renewed for two years
PAR expiration Date: December 2004
Current Standard Date: October 2001
Current Draft Being Worked On: #9 Dated April 2003
Meeting Date: ***DID NOT MEET***

7.8.2.2.9 C57.12.34 Three-Phase Padmounted Distribution Transformers

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

PAR Status: Approved 9/21/1995 (For Standard Development)
PAR expiration Date: December 2004
Current Standard Date: New Standard

This NEW Standard is a combination of the following two Standards

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

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

Current Draft Being Worked On: 10 Dated : June 2003

Meeting Time: March 8, 2004 Time: 1:45 PM

Attendance: 30 Total

16 Members

14 Guests

2 Guest Requesting Memberships

Issues, Remarks & Announcements:

The ballot is still out on this proposed standard and will close as soon as a 75% return of the ballot group is received.

Ron Stahara called the meeting to order, introductions were made, and an attendance roster was circulated. Ron stated that the document had been out for ballot and had closed on March 4, 2004. He asked Steve Shull to report on the proposed standard's current status. Steve stated that there were 58 votes. This consisted of 2 disapproved, and a number of affirmative with and without comments. Because we have a total in the ballot group of 90 members, we do not have enough votes to qualify for a valid ballot. Therefore, the ballot was opened for another 15 days to allow Ron and Steve to poll

those not responding to hopeful get a qualifying ballot. Steve felt that he might be able to talk the respondents who had a disapproving vote to change their vote so that we could get this standard approved.

Ron then asked the working group to look to the next revision of C57.12.34 and thus a new PAR. He asked the group to consider the following suggestions, which in part came from the comments that were raised during the balloting of PC57.12.34/D9.

1. Expanded the scope to 10 MVA, 69 kV and below high voltage, 34.5 kV and below low voltage.
2. Change the minimum impedance on 300 & 500 kVA, 208/120 ratings to limit faults.
3. Change the maximum Secondary Voltage to include other voltages that are not native to the USA.
4. Change the Table 2 values based on new calculation philosophy.
5. Add a new pad-mount front plate for a three, phase miniature design.

This developed into a lively discussion with no real resolutions. Steve stated that he would provide a packet to the members to act as a medium to help them develop their positions. The consensus of the group was that this product standard would not be recommended for international acceptance. This led to a conclusion that the additional voltage configurations referred to in item 3 listed above might not be necessary.

7.8.2.2.10 C57.12.35 Bar Coding For Distribution Transformers

Lee Matthews & Giuseppe Termine Co Chairs

(lmattthews@howard-ind.com & Giueseppe.termine@peco-energy.com)

PAR Status: Active for Reaffirmation

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

Current Standard Date: 1996

Current Draft Being Worked On: NEW

Meeting Time: March 8, 2004 Time: 3:15 PM

Attendance: 25 Total

0 Members

25 Guests

14 Guest Requesting Memberships

Issues, Remarks & Announcements:

The meeting began with introductions of those in attendance. Attendance rosters were circulated and attendees were asked to indicate their desire to become working group members on the rosters.

Ed Smith & Lee Matthews gave a report on the re-affirmation ballot that was conducted in 2002. The working group had not met since that ballot due to the death of previous chairman.

There were 77 people in the balloting pool. 63 ballots were returned. 60 votes were affirmative. 3 were negative. The negative votes have been resolved.

Ed Smith suggested that the group conduct a survey to determine if the current standard meets the needs of users. Mike Culhane suggested that manufacturers provide sample formats that are currently being provided to their customers. This information, from several manufacturers would cover the majority of user's requirements.

A new PAR will be initiated. The consensus was to change the scope of the document to state "Distribution Transformers", rather than list specific types of distribution transformers as in the present document. The scope will also be expanded to include step voltage regulations.

The meeting was adjourned at 4:00 PM.

7.8.2.2.11 C57.12.36 Distribution Substation Transformers

John Rossetti & David Aho - Co Chairs

(rossetti@mlgw.org & daho@cooperpower.com)

PAR Status: PAR Approved June 2002

PAR expiration Date: October 2005

Current Standard Date: NEW Standard Under Development

Current Draft Being Worked On: #6 Dated February 28, 2004

Meeting Date: March 9, 2004 Time: 11:00AM

Attendance: 38 Total

15 Members

23 Guests

3 Guest Requesting Membership

Issues, Remarks & Announcements:

Good progress was made at this meeting. A few items were uncovered that the WG felt should be addressed prior to balloting. These changes will be made along with a variety of other issues covered. The general consensus was that this document, once revised, could be submitted to IEEE for editorial review. The goal will be to ballot this document prior to the fall meeting.

Due to the aggressive agenda and in the interest of time, introductions were skipped. A quick review of the minutes from the prior meeting was reviewed in an attempt to avoid having to cover the same details. After approving these minutes, the WG jumped into reviewing the changes made to the draft

document. All editorial and technical changes were reviewed with some spirited discussion. Some new suggestions were also made to enhance, clarify, or correct specific sections. A few of these items were either rejected, or tabled for future consideration, as there currently weren't enough strong feelings by the majority of the WG to include them at this time.

After the changes were reviewed, a small amount of time was used to review tables 4.2 – 4.5 for voltage applications. The original intent of this section was simply to provide a user of this standard some guidance as what's considered a typical or readily available voltage transformation ratio. Over the years this section has grown into also trying to define typical ratings for each kVA level. The result has been much confusion and controversy, with questions continuing to arise as to the need for such tables. A number of suggestions were made ranging from: rewrite the section, remove portions, or simply remove everything. Another shot will be taken to clean this area up in order to avoid potential ballot problems.

The last order of business was to assess the possibility of getting this document out for ballot prior to the Fall meeting. There were a few items brought up for discussion that needs to be addressed prior to balloting. A few of these received good suggestions and should easily be resolved (i.e.: 25 & 35kV BIL levels). These changes will be made along with the variety of other issues covered. The general consensus was that this document, once revised, could be submitted to IEEE for editorial review. The goal will be to ballot this document prior to the fall meeting.

As everyone appeared anxious for lunch and two thirds of the group had already left, the meeting adjourned at 12:20 pm.

7.8.2.2.12 C57.15-200XStep-Voltage Regulators

(Craig Colopy & Gael Kennedy Co Chairs

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

PAR Status: Active

PAR Expiration Date: April 2004

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

Current Draft Being Worked On: Draft 3 Dated: March 2004

Meeting Date: March 9, 2004 Time: 15:15

Attendance: 22 Total

11 Members

11 Guests

5 Guest Requesting Membership

Issues, Remarks & Announcements:

Introduction of all Present

Minutes of the Last Meeting Approved (moved by Ron Stahara, 2nd by)

Routing of Attendance Sheets

Comments on Draft 3

Referencing C57.91 instead of C57.95 in Section 2

Added Definition of Platform Mounted

Updated Definition of pole mounted

3.46 sealed tank: definition on seals will be consistent with all standards

Move statement on temp to appropriate location

Added Voltage supply ratio definition

Would like better definition of Type A and Type B

4.3.3 for three phase regulators

5.2 clarify 55/ 65 ratings

5.4 ratings revised to 668 amp maximum

Table 5 revise 7960 to 7970

Table 10 revise max to 668_ _Table 13 can be used as 50 or 60 hz

Table 14 Bushing notation for both conductor connector and threaded stud

6.7.1.2.f clarified current ratings

7.2 clarify comment on

8.1.3.2d comment taken directly from C57.12.90

8.3.2 tolerances for ratio comments clarified

8.5.1 taken directly from C57.12.90_

8.5.4.2.1 note revised

8.6.3.2.3 revise to shall

8.6.6.1 clarified existing comment

8.6.7.2 need to investigate the wording.

Craig will check for the Official IEEE Symbol for the Temperature designations.

Need to reference in 4.1 on enclosure integrity C57.12.28 – Don M's comment Annex C convert numbers from B to C

Specific Note: THIS IS THE FIRST TIME ALL THE REGULATOR MANUFACTURERS SHOWED UP IN THE SAME ROOM AND SURVIVED

The corrected Draft which will now be 4 will be sent out for a 45 day comment period.

Motion from Ron Stahara to adjourn, 2nd, and passed.

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

Richard Hollingsworth & Thomas Callsen Co Chairs

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

PAR Status: Submitted for editorial review and balloting

PAR Expiration Date: December 2005

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

Current Draft Being Worked On: D11 Dated: August 2003

Meeting Date: March 8, 2004 Time: 08:00AM

Attendance: 27 Total

14 Members

13 Guests

0 Guest Requesting Membership

Issues, Remarks & Announcements:

Reviewed the status of the PAR. The "Ballot initiation form" to be submitted.

Reviewed the next step for the working group. The next step is to bring Step Voltage Regulators and Dry type into the document. It appears that the Dry Type may fit into the present standard with the extended data set. The Step Voltage Regulators will probably need a separate extended data set.

One time slot will be required at the next meeting.

7.8.2.2.14 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: March 10, 2004 Time: 11:00AM

Attendance: 15 Total

7 Members

8Guests

1 Guest Requesting Membership

Issues, Remarks & Announcements:

Minutes of March 17, 2003 meeting were approved as submitted.

Review of D4 ballot results; 94 (76%) returns, 14 with comment, one negative. Changes to the IEEE metric policy resulted in D5 with changes to the body and introduction of D4. Consequently, negative was withdrawn. D5 is to be re-circulated for ballot.

Review of D5 with corrections and clarifications some brought forward from comments on D4 follows:

Introduction – include IEEE metric policy revision and background/requirement of guide.

1.2 Correct reference to IEEE/ASTM SI 10-2002

1.3 Removed.

3 Removed 'General'

3.1 Clarify intent of clause.

3.2 Correct conversion example.

3.7 Use of in for inches (throughout document)

3.8 Proper use of terms eg, value vs dimension (throughout document)

3.12 Replace 'Standard Hardware Items' with 'Trade Items'. Working group preferred to show fractional vs decimal dimensions.

3.13. Proper reference to Bibliography.

3.17 Clarified example explaining mass and force.

3.24 Clarified equipment lifting and carrying capacity vs mass.

Annex A: Removed unnecessary references to documents in order to avoid future requirements for revision.

Working Group moved to approve D5 as corrected for re-circulation.

Revised conversion spreadsheet will soon be available on IEEE trans web site.

No meeting required in fall.

7.8.3 Subcommittee Old Business:

None reported

7.8.4 Subcommittee New Business:

None reported

7.9 Dielectric Test SC – Loren B. Wagenaar, Chair; Stephen Antosz, Secretary

The Dielectric Test Subcommittee (DTSC) met on Wednesday, March 10, 2004, at 1:30 p.m., in San Diego, CA with 69 members and 53 guests present. 15 of the guests requested membership on the Subcommittee. See the last page of these minutes for attendance list.

7.9.1 Chairman's Remarks

After introduction of the attendees, the Chair reviewed some of the highlights of the Administrative Subcommittee meeting held on March 7, 2004.

2) Minutes due to Tom Prevost and Sue McNelly by April 30.

3) Next meeting date and location is October 24-28 2004 in Las Vegas, NV. Spring 2005 will be in Jackson, MS.

- 4) The minutes of the Fall 2003 meeting in Pittsburgh, PA were approved as written, and are available the IEEE Transformers Committee Web Site.
- 5) There has been much discussion regarding changes to the present 3.5 day length and the format of the Thursday Main Committee meeting, however no decisions have been made. A task Force within the Administrative Subcommittee has been formed to study the issue in more detail and make recommendations.

7.9.2 Working Group Reports

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

Attendance: 23 members and 29 guests attended the meeting. Attendees introduced themselves. The activities of the October 6, 2003 Pittsburgh PA meeting were reviewed.

The Working Group conducted a pre-ballot survey of PC57.127/D2.0 Draft Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors. The intent was to determine which parts of the Guide could bring negative ballots or requests for technical or editorial changes.

1. Hem Shertukde led the group discussion of Sections 1 through 4, which included the overview of the guide, definitions, introduction to systems and signal transmission characteristics. It was suggested that the type of document be changed from "Guide" to "Recommended Practice." Revisions were largely editorial.
2. Allan Darwin's group focused on Sections 5 and 6 that cover equipment specifications and field and factory tests differences and Annex A Bibliography. Editorial changes were suggested.
3. Ron Daubert led the discussion on Sections 7 and 8 about test procedures in the field and factory and Annex B signal processing. A suggested technical change was to use the term gas rather than nitrogen above the oil in order to encompass free-breathing units. Several editorial changes were suggested.
4. Barry Ward's group reviewed Section 9 characteristics of signals and Section 10 integrating AE results with data from oil analysis. A number of suggestions were made to improve the document, which would have been negatives, as well as editorial and technical comments. Several of the suggested changes were:

- The terms repetition rate and synchronous will be added to definitions
 - Figure 13 PD waveforms needs more explanation
 - Figure 7 showing an attenuated AE burst should also show a non-attenuated waveform for comparison
5. Ernst Hanique's group covered Section 11 Acoustic Activity Interpretation and Annexes D and E calibration. Editorial changes will be made to Section 11 and Annexes D and E will be re-written to be more general.

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

The WG met on Monday with 18 members and 17 guests present. Mark Perkins did not attend so Loren Wagenaar chaired this meeting. The Pittsburgh minutes were approved as corrected; the correction was regarding an issue raised by Subhash at the Pittsburgh meeting concerning not measuring terminals rated less than 115 kV on Class II transformers.

Dr. Lemke made a report on the initial meeting of the TF on Electrical PD Measurements (complete minutes will follow here) There was discussion whether to keep the old document or develop a new one, and it was decided to use the old document only as background material but develop a completely new document and format.

Under WG business, Subhash stated that several users have been specifying that buried tertiary windings be subjected to applied and impulse tests. This requires that temporary bushings be bought. C57.12.90 does not cover these situations, so a small group consisting of Mark Perkins, Subhash Tuli, and Bertrand Poulin was established to study this situation and make recommendations.

Due to the absence of the Chair, the meeting was then adjourned.

7.9.2.3 Task Force on Electrical PD Measurement - Eberhard Lemke, Chair

1. Introduction and Attendance

The Chairman opened the meeting at 9:30 am and welcomed the member and guests. There were 50 attendees present, 22 of them will join the TF as volunteers.

2. Approval of Agenda

The submitted tentative agenda was approved as it was

3. Chairman's Remarks

First it has been pointed out that the main goal of the new document to be submitted is the harmonization of the existing IEEE Guide C53.113 (1991) with the third edition of IEC 60270 (2000-12). After that some background knowledge was presented dealing with the fundamentals on measuring the PD quantity "apparent charge". In this context it was stressed that the reading of commercially available PD measuring instruments is mainly governed by the measuring frequency characteristics and the pulse train response as well. Hence, the efforts will mainly focus on the specification of these parameters.

4. Discussion

In the discussion it was agreed that for the incorporation of the actual IEC recommendations a new document is required, which bases on the technical background of the existing guide. A first draft will be submitted by the chairman before the next meeting in Las Vegas.

The discussion went also on the aspect whether the term "Guide" should be substituted by "Recommended Practice" or not. This matter, however, should be discussed further during the next TF meeting.

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

The WG met on March 9, 2004, from 3:15 pm to 4:30 pm. Eighteen members and fourteen guests attended the meeting. The minutes of Pittsburgh meeting were approved as written. No changes were required on the agenda.

The first subject on the agenda was to review the results of the survey done within the Dielectric Tests Subcommittee on the revision of clause 10.3.1.1 of C57.12.90 related to impulse testing and regarding the recommended minimum impulse generator energy level to be met during lightning impulse tests for cases where the 50% tail time is shorter than the minimum allowable value of 40 μ s. The survey has been sent on February 20, 2004, to approximately 140 members. Twenty-five surveys were returned (18% returned). Out of these 25 responses, 9 were affirmative without comments (36%), 10 affirmative with comments (40%) and 6 negative (24%). The details of the negative responses were not discussed. The WG chair and vice-chair will contact each individual who provides comments for trying to resolve the negative comments as well as the affirmative responses with comments. The essence of the negative comments is as follows:

- some of the recommendations and/or information given need to be move to the impulse test guide;
- the recommended energy levels seem to be too low;

- use of resistor should be agreed upon ahead of time;
- the recommended energy levels for class IVb and IVc are too high;
- the paragraph regarding the statement to be given by the manufacturer during bidding stage seems to be inappropriate in a Test Code;
- justification of a change in the Test Code without field problems is difficult to justify;
- change the concept of minimum energy levels to minimum capacitance values;
- may force manufacturers to invest considerable amount of money for improving their impulse generator.

The WG chair & vice-chair will try to get counter proposals from individuals who cast negative surveys and will issue a revised proposal based on the outcome of the resolutions. This revised proposal will be surveyed within the Dielectric Test Subcommittee prior to next meeting.

A quick survey within manufacturer representatives present during the meeting showed that the majority are able to cope with the recommended minimum energy levels given in the proposal.

After discussion, it has been agreed upon that a note giving the impacts of the recommended minimum energy levels will be added. This may help people to see the impacts of such proposal with their respective testing capabilities. Moreover the wording will be improved for stating clearly that these recommended levels are not mandatory but only recommended.

The second subject on the agenda was related to the revision of clause 10.3.1.3 of C57.12.90 dealing with Chopped-wave tests. The changes proposed are:

- the gap shall be located at a distance from the test object not exceeding the height of the transformer for insuring a fast chopping time;
- tolerances have been added to the time-to-chop;
- rules for using resistors limiting to 30% the overswing in reversed polarity are now given;
- details regarding the type of chopping gap and their effect on the waveshape (sphere gap and rod-rod gap) are given in a note. The use of rod-rod gap is permitted since this is representing more accurately a flashover within an air insulated substation.

After discussion, it has been agreed upon that:

- the tolerances given on the time-to-chop will be investigated. If not mentioned in IEEE C57.12.00 nor in IEEE C57.12.90, the IEC tolerances will be proposed;

- A maximum chopping time of 1,0 μ s will be given as an upper limit. Details regarding how to reduce the chopping time will be introduced in C57.98;
- A general reference to IEEE Std.4 will be added in clause 10.1.1 of C57.12.90.

A revised proposal will be worked out according to the decisions made and will be surveyed within the Dielectric Tests Subcommittee.

Since the meeting was running out-of-time, the third subject on the agenda related to impulse tests on windings protected by non-linear voltage limiting devices has not been discussed. This subject will be reported on the next meeting agenda.

7.9.2.5 Working Group for Revision of the Impulse Test Guides C57.98 and C57.138 – Art Molden, Chair; Joe Melanson, Secretary

The meeting started promptly at 3:15PM on Monday March 8th, with 38 attendees present of which 11 were members and 6 were guests requesting membership.

After the formal introductions Mr. Loren Wagenaar was called upon to report to the working group on the outcome of the recent ballot for reaffirmation of C57.138, the Guide for Routine Impulse Testing of Distribution Transformers. Loren reported that the ballot returns were 100 percent in favor of the reaffirmation of this standard, but that comments obtained from the ballot would require that the Guide be reviewed and updated before the next review cycle, 5 years from now. Loren also reported that the revision of the C57.138 guide will now be included in the scope of our working group such that this working group will now become “The WG for Revision of Impulse Test Guides” A new PAR application will be made for the revision of this guide and electronic copies of the guide and the comments from the recent ballot will be made available to our WG.

The meeting then continued with approval of the Minutes of the Pittsburgh meeting and the following items of old business were discussed:

- 1) Minimum Energy Proposal. This proposal relates the kVA rating of a transformer to the available energy of an impulse generator and the ability to obtain the required impulse tail duration. A table included in the proposal was copied and modified by Art Molden for the purpose of our discussions, so as to indicate the number of IG stages that would be required for a particular BIL level. The intent here was to provide the members with practical examples of the implications of this proposal. Various comments and questions were discussed including a proposal by Ramsis Girgis where, for those cases where tail duration was a problem two impulse tests could be performed; one test would be applied to the terminal under test using the short tail duration, after which a second test would be performed using a tail extended by use of our so called “alternative methods” (for example placing a resistor in series with the non

impulsed terminal of the winding under test). Bertrand Poulin commented that the impulse used in the “short tail duration test” should be the best (longest) available using the optimum configuration of available impulse generator stages. This suggestion was well received by the members.

Some concerns were again voiced by manufacturers concerned that the proposal would require them to replace existing test equipment to meet the proposed energy levels. Pierre Riffon pointed out that proposed energy levels were not mandatory levels but minimum recommended levels. The only additional requirement was, that those manufacturers not having the recommended levels available from existing test equipment would be required to make that known at the contract bidding stage, along with the test strategy that would be used to optimize the applied impulse wave shape used during the impulse test.

- 2) Non-linear Devices (NLD). A variety of proposals regarding the number and levels for the Reduced Full Wave (RFW) shots to be applied during tests on transformers using NLD were discussed. The most favorable compromise offered was for a sequence that included two RFWs, one at a level between 50% and 70%, the second at a level between 75% and 85%. The main concerns were on selection of RFW levels that would enable repeatable operation of the devices to be demonstrated during the test. It was pointed out that while the repeatability of operation at particular applied voltage levels above the NLD operating level was good, the actual applied voltage level required to cause NLD operation was not known prior to the impulse test. The test sequence would therefore be:

RFW1 (50% to 70%)

RFW2 (75% to 85%)

100% FW

2 Chopped waves

100% FW

Repeat of RFW2

Repeat of RFW1

The actual levels used in the test to be agreed between the manufacturer and user. The transformer would be considered to have passed the test if the impulse records obtained before the chopped wave applications compared with the corresponding voltage level records obtained after the chopped wave applications

- 3) Steve Beckman again pointed out that the present test code includes wording to the effect that the 100% full wave be the final impulse test applied to the terminal under test and so appropriate changes would have to be made to the test standard itself.

- 4) Voltage Divider Measuring Lead. A paragraph was provided by Pierre Riffon regarding connection of the voltage divider to the terminal under test.
- 5) Pierre also provided additional paragraphs regarding the location of the chopping gap and the length of connecting leads.

There being no other new business the meeting was closed at 4:15 PM.

However, as was later pointed out by Subhash Tuli an item of old business regarding Switching Impulse testing, though noted in our previous meeting minutes, had not been discussed during this meeting. It was therefore suggested that discussion of this topic would be continued via our electronic mailing list system.

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

Tables needed and proposed

- a.) Y-Connected Test Levels
- b.) Delta-Connected Test Levels
- c.) Chopped Wave and Switching Surge vs. BIL
- d.) Relationship Between Short & Long Time
- e.) Relationship for Arrester Protection
- f.) Arrester Protection Levels – Wye
- g.) Arrester Protection Levels – Delta
- h.) Commentary on Considerations for Delta and Wye

Items a) and b) were addressed and the Chairman has the latest version of the Tables. None of the other items were addressed.

7.9.3 Liaison Reports

7.9.3.1 Surge Protection Devices – Bob Degeneff

- Recall that several years ago the Dielectric Test SC provided the Surge Protective Devices Committee with an insulation characteristic curve for the transformer to be used in the evaluation of insulation coordination between arrester and transformer.
- Recall that the curve was based on 5 points; FOW, CW, BIL, BSL, and Induced.
- Initially there was resistance to use of these characteristics, since it was a significant departure from convention.
- Now the 5 point curve has been fully incorporated into C62.22, Paragraph 5.2.5.1-3.
- It will be out for ballot soon, as reported by Eva Tarasiewicz.
- Please look for it, get on ballot pool, and vote.

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

There has not been a meeting of the HVTT WG since the one reported at the Pittsburgh meeting. The next meeting will be at the facility of Florida Power and Light in West Palm Beach, FL on April 14-15.

7.9.3.3 PCS TF on Frequency Response Testing – Rowland James

The PCS task force met for the development of a guide for Frequency Response Analysis (FRA) in San Diego, California on March 9, 2004 at 3:15 P.M. There were 39 persons in attendance, 21 members & 18 guests of which 3 requested membership.

Rowland James made a brief report on the development of the draft and thanked the contributors for the efforts put forth in the development of the guide. He also announced that a PAR will be submitted for approval. The minutes were presented and approved.

Charles Sweetser reported that he received contributions for all six sections. The contributions were appended as submitted. Each section was then discussed.

- **Section 1:Scope and Application** – Progress has been made on this section. A definition section was added, however definitions are needed. Further input of expanded use and application is also needed. It was recommended to add verbiage regarding baseline, sister unit, and phase comparisons in section 1.1. Subhash Tuli will review this section for technical content.

- **Section 2: Test Parameters** – Ernst Hanique discussed test leads and emphasized that test lead lengths must not differ more than one centimeter. Fred Elliot and Sokom An reported in absentia that greater repeatability is possible when testing the high voltage because test leads are fully extended. Careful attention given to placement of the leads performing measurements on shorter bushings. Richard Breytenbach commented on the use of either magnitude or phase measurements. He stated that they are directly related to one another and therefore there should be no difference in the results. Sokom An will be asked to provide additional review to this section.
- **Section 3: Measurement Parameters (test plan)** - A section on safety is included in this section. Diagrams have been added to illustrate various test setups. Charles Sweetser discussed types of test, namely, open circuit, short circuit and inter-winding tests and displayed typical test curves. He asked the Task Force if we should establish a convention. This section will be further reviewed by Richard Breytenbach.
- **Section 4: Test Records** – Open data formats and nameplate data requirements were discussed. This section requires further development to determine what will be the recommended format and required fields. Bertrand Poulin and Barry Ward will address.
- **Section 5: Analysis and Interpretation** – There perspectives were submitted regarding interpretation (sweep, impulse, Objective Winding Asymmetry). The group expressed that we need to document what we already know. Richard Breytenbach made a brief presentation on FRA interpretation and explained the significance of the lower frequency range (core displacement) and the mid range, 50-200 kHz (bulk winding movements). Larry Coffeen gave a presentation on NEETRAC's technology that will produce a predictive maintenance system that is designed to detect loose coils. Richard Breytenbach, Larry Coffeen and Charles Sweetser will work on this section.
- **Section 6: Appendix I** – Bob Degeneff will continue to develop this section.

Charles Sweetser announced that the Task Force will establish a relationship with CIGRE regarding FRA testing

7.9.3.4 Web Page Development – Eric Davis

Chairman not present. Nothing to report.

7.9.4 Old Business

7.9.4.1 Phase to Ground Clearances – Loren Wagenaar

Nothing to report. Will continue this activity next time.

7.9.5 New Business

7.9.5.1 Alan Wilks is co-chair of the WG on Overhead Distribution Transformers, C57.12.20. He recently sent an email to Loren requesting resolution of the issue that specific dielectric tests required on distribution transformers in C57.12.20 Paragraph 5.2 are different than those listed in C57.12.00. This clause has been in C57.12.20 since at least 1981, and the WG is asking that it be included in the appropriate way into C57.12.00.

This issue will be referred to Mark Perkins' WG on Low Frequency Tests for resolution.

7.9.5.2 It was proposed to extend Class 2 units down to 69 kV, since many customers are specifying this anyway. (Don Platts and Bob Hartgrove agreed that their company's do this.) This would cover corona and impulse testing. In some cases users are going all the way down to 15 kV, even with the understanding that there is no capacitance tap.

7.9.5.3 Phil Hopkinson proposed that all Class 1 transformers receive an Impulse Test.

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

MINUTES OF THE MEETING OF THE HVDC CONVERTER TRANSFORMERS & SMOOTHING REACTORS S.C. IN SAN DIEGO, CA, MAR. 8, 2004

The S.C. met in the Cockatoo Meeting Room of the Catamaran Resort Hotel in San Diego, CA on Mar. 8, 2004 from 1:45 p.m. to 3:00 p.m. There were 12 members and 4 guests present. One of the guests, Roger Verdolin requested membership. Note also that one new member was added since the Pittsburgh meeting; Tony Weekes of Manitoba Hydro. The following are the highlights of the meeting.

1. Introductions were made and the minutes of the Pittsburgh meeting were approved. The S.C. was briefed re the Administrative S.C. meeting.
2. The life of the current version of C57.129 will expire in Sept. 04. After some discussion it was agreed by the S.C. to seek a PAR for the revision of C57.129 vs the reaffirmation option. The Chairman stated that he would work with Bill Chiu, the Standards Subcommittee Chair, to obtain a PAR.

3. Tony Weekes of Manitoba Hydro made a presentation based on a paper he co-authored; “Risk Assessment Using Transformer Loss of Life Data”. A copy of his presentation and the paper will be distributed to S.C. members only with the minutes. A brief introduction and reference to the paper will be included in Annex D “Overloading of HVDC Converter Transformers”. (See 6. below).
4. Peter Heintzig’s proposed addition to Annex D on how to specify overloads will be included in the next draft of Annex D.
5. Lars-Erik Juhlin made a presentation of his analysis of the information contained in the report prepared by Cigre TFB B4.04/42 on converter transformer failures; “Analyses of HVDC Converter Transformer Performance”. Very few of the failures could have been prevented by changes in the test code for converter transformers. A number of bushing failures could have been impacted by test code. A copy of Lars-Erik’s analyses will be provided to the Bushing S.C. Two converter transformer failures might have been influenced if Dissolved Gas Analyses were part of the temperature rise test; especially one related to a bad connection. However, since the temperature rise test does accurately reflect the heating effect of harmonics, DGA may still not indicate a problem due to localized overheating. Lars-Erik’s analysis will be used in the process of the revision of the test code in C57.129.
6. Peter Heintzig will produce a draft revision of Annex D including the specification of overload criteria and will also incorporate a reference to Tony Weeke’s presentation/paper. He will then send the new draft to Pierre Riffon, Waldemar Ziomek and Lars-Erik Juhlin for their comments/input.
7. Les Ricksiedler will make changes to Draft #1 of the revision of C57.129 based on comments/proposals in his e-mail of Aug. 22, 2003. He will, when appropriate, include explanatory comments in the margin. Les’s changes will be circulated to S.C. members for comment as part of Draft #2 of the revision of C57.129.
8. Lars-Erik provided, for information to S.C. members, a copy of the portion of the most recent catalogue of CIGRÉ publications, dealing with transformers.

The Chairman will issue Draft #2 of the revision of C57.129, based on S.C. member contributions as outlined above, prior to the next S.C. meeting. The meeting adjourned at 3:00 p.m.

Richard F. Dudley

7.11 Instrument Transformers – James E. (Jim) Smith, Chair

5 members and 9 guests attended

Jim Smith was unable to attend so the meeting was chaired by Ross McTaggart

7.11.1 Chair's Remarks & Announcements:

A brief summary of the Website development meeting was presented

The previous meeting minutes were approved as written

7.11.2 Old Business

Thermal Evaluation

The general feeling was that although the proposed test procedure is very comprehensive, it is not possible for voltage ratings over 145 kV and very costly even up to that level. The total test costs could be as high as \$200K.

The most important aspects of the tests were identified as:

- 1) To verify that the IT can mechanically survive thermal cycling – eg no cracking occurs (mainly for cast resin units) and additionally for oil and gas units that no leakage occurs
- 2) At low temperature, the partial discharge extinction voltage remains at a safe level, and
- 3) At low temperature, the accuracy performance remains within acceptable limits

The consensus of the group was that these could be verified using simplified test methods, basically as follows:

- 1) Thermal cycling to be done separately, with no continuous monitoring, only routine tests before and after
- 2) PD and accuracy tests to be done by putting the test sample in a freezer and then removing it and quickly doing the test (note - there is some concern that the inevitable frost on the porcelain surface will interfere with PD measurements – R. McTaggart will try to schedule a test on a Cap section to investigate)

It was agreed that someone would write up an alternative procedure based on this before the next meeting.

7.11.3 New Business

We were advised by Aaron Snyder that any new definitions that are added to Standards should be sent to the WG on Standard Terminology for inclusion in C57.12A.

7.11.4 Working Group Reports:

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

The WG met on March 9, 2004. Five members and thirteen guests attended the meeting. Four guests requested membership. The meeting was co-chaired by Mr. P. Riffon and Mr. R. McTaggart.

Minutes of the Pittsburgh meeting were approved as written.

The Trial-Use Standard C57.13.5 has been published by IEEE on August 2003. None of the members has received a complimentary copy. The SubCommittee Chairman will be asked to contact IEEE for getting the complimentary copies to the WG membership. Its validity is two years and will expire in August 2005. The WG shall prepare a revision as soon as possible in due time for balloting. Members are invited to provide feedback regarding the application of C57.13.5.

The impulse test section of the new normative Annex (Annex H) related to unbalance current transformers for use as unbalance current protection of capacitor banks have been discussed once more and has been modified according to Pittsburgh meeting decisions. The use of a resistive burden on secondary windings for improving the tail time of the impulse waveshape when applied across the primary winding is now incorporated. No further comments have been received. This draft will be circulated to the WG membership for survey prior to the next meeting. Typical oscillograms of a lightning impulse waveshape across primary winding will be added as additional information.

The second subject on the agenda was related to the allowable temperature rise of terminals of instrument transformers during temperature rise test. This subject has been also presented during the previous WG and SubCommittee meetings in Pittsburgh. No further comments were received concerning the proposal. The same values as used for switchgear in IEC 60694 and IEC 60943 has been proposed. This proposal limits the temperature rise of terminals to 50°C for bare aluminum or copper terminals, 65°C for tin-coated terminals and 75°C for silver or nickel-coated terminals. This draft will be circulated to the WG membership for survey prior to the next meeting.

An informative Annex related to TPY cores seems to be necessary for US manufacturers dealing on export markets. Such current transformer class is not generally in use in North America. Only few utilities are requesting such a performance.. A first draft will be issue prior to the next meeting. This informative Annex will be mainly based on Annex D of IEC 60044-6. The testing section will refer to IEC 60044-6.

As New Business, a discussion took place on the definition of standardized burdens to be used when applied to 1A windings. After the discussion, the WG is to the opinion that the concept of limiting voltage for relaying application CTs or the burden value in ohm for metering CTs shall be kept. This subject is not under the task of this WG and shall be bring to the WG responsible of the revision of C57.13 (T. Nelson).

The meeting adjourned at 8:45 on March 9, 2004.

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

The subcommittee met on March 9, 2004 in San Diego, CA, with three members and ten guests present.

Old business-

Ballot results:

Pool closed October 12, 2003

Ballot met 75% returned requirement (85% returned)

Eligible people in-group

63 affirmative

3 negative with comments

4 abstention votes

The 75% affirmation requirement was met (95% affirmative)

New business

1) Review and discussed ballot editorial comments. . A marked up Std was circulated.

Chair Comments: WG Group accepted all balloter editorial comments.

2) Review and discuss negative ballot comments.

1) TW Olsen, Siemens Power T&D

a. Missing Abstract.

i. Chair Comments: (Not required for std, per IEEE staff).

b. Removal of “and Relays” from 5.1 title and footnote #2, pg 7.

- i. Chair Comments: WG member was concerned that removal was in fact technical, because it suggests these burdens be excluded for relay ratings (which is not true). Balloter comment not accepted; this section will be re-circulated

2) Daniel Slomovitz, UTE

- a. Requested lower VA burden for VT's (not accepted)
 - i. Chair Comments: Retracted by Balloter by E-mail before meeting.

3) Jeffrey Nelson, TVA

- a. Document Title should read "Trial Use Standard for High Accuracy Instrument Transformers" based on phrase "trial use" in introduction.
 - i. WG concurred to recirculate as a Full Standard.
- b. Misc reference corrections style and grammatical (all accepted)
- c. Request WG take under consideration CT accuracy testing at RF.
 - i. WG rejected. Chair Comments: Balloter will accept WG consensus.
- d. Request WG take under consideration VT accuracy testing 90%&110%Vp.
 - i. WG rejected. Chair Comments: Balloter will accept WG consensus.
- e. Section 6.1.1 (*basis of negative Ballot*) Delete "A current transformer may be certified to this standard when demonstrated to inherently meet the stated accuracy class using the following tow test points: at 100 % of rated current using burden E0.04, and at 5% of rated current using the maximum burden for which it is rated" Balloter found this confusing and requested reconsideration by WG.
 - i. Chair comment
 - 1. Chair re-wrote section 6.1.1 to improve clarity, but not procedure.
 - 2. WG discussed and edited rewrite and new format
 - 3. WG agreed to revisions, which will be re-circulated.

Summary.

- . Chair will recirculate Standard for three items:
 - Acceptance as full standard (remove trial guide from introduction).
 - Clarified format of section 6.1.1
 - Keeping reference to "relays" in section 5.1, along with footnote.

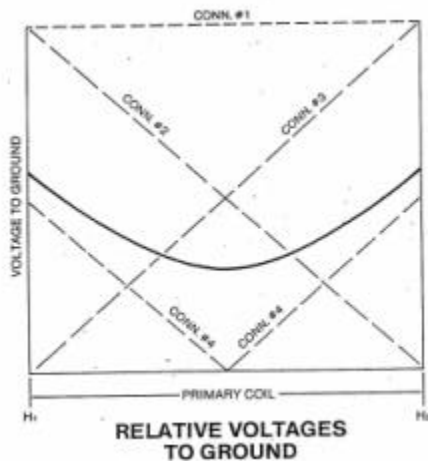
Chair comment: Consensus of group anxiously awaits publication of this standard.

Partial Discharge Connections- Two Bushing Voltage Transformers

Connection 1 accurately determines extinction of partial discharge in the primary bushings and primary major insulation. The purpose of Connection 2 and 3 is to measure extinction of partial discharge in the primary winding. A shortcoming of Connection 2 and 3 is that it puts excessive stress on the bushings in order to achieve moderate primary over-voltage. Partial discharge from the over stressed bushings masks the ability to measure partial discharge originating from turn to turn voltage stress in the primary winding. Passing this test increases product cost because it requires manufacture of bushing quality to the next higher voltage class.

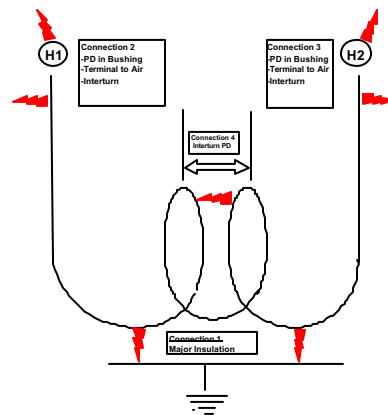
The Cross Winding test (Connection 4) can substitute for or referee for the connection 2 and 3 connections. The stress to ground on the floating H1 and H2 bushings is one half of the induced primary excitation. If the bushing partial discharge extinction voltage is established appropriately above in-service levels using the Connection 1 test, one can conclude any discharge observed during the Cross winding test must originate within the primary winding.

The cross winding test can also be performed using a applied polyphase source. This duplicates in service conditions for a two bushing voltage transformer, and a complete evaluation of the product for partial discharge can be performed in one test setup.



[Purpose of this chart was to emphasize each connection is limited in its ability to pinpoint location of partial discharge. Use of various test connections to isolate the source of partial discharge in a dry type voltage transformer will result in better interpretation of test results.]

Conceptual Location of Partial Discharge in Instrument Transformers



[Purpose of this chart is to provide a conceptual framework to support use of various test connections.]

Proposed Partial Discharge

Test Levels for Various Connections

SUGGESTED MINIMUM PRESTRESS VOLTAGES (15 SECOND)

Connection	Current Transformer	Voltage Transformer	
		Line to Ground	Line to Line
Connection 1 (Major Insulation)	(1.1) NSV	22kV >110BIL* 12kV < 110 BIL*	(1.1) NSV*
Connection 2 (Major & Interturn Insulation)	-	(1.25) Vp	(1.25) Vp
Connection 3 (Major & Interturn Insulation)	-		(1.25) Vp
Connection 4 (Interturn Insulation)	-	(1.25) Vp <small>(with insulated neutral)</small>	(1.25) Vp

TEST VOLTAGE FOR PARTIAL DISCHARGE MEASUREMENT (50 PCMAX)

Connection	Current Transformer	Voltage Transformer	
		Line to Ground	Line to Line
Connection 1 (Major Insulation)	(0.67) NSV	22kV >110BIL* 12kV < 110 BIL*	(0.67) NSV*
Connection 2 (Major & Interturn Insulation)	-	(1.15) Vp	(1.15) Vp
Connection 3 (Major & Interturn Insulation)	-		(1.15) Vp
Connection 4# (Interturn Insulation)	-	(1.15) Vp <small>(with insulated neutral)</small>	(1.15) Vp

* denotes diagnostic, referee tests

Vp is primary voltage rating on nameplate, not emergency or max voltage rating.

#Connection 4 test can substitute for, or referee Connection 2 & 3 test.

Up to 75pC is allowed on connection 2 if extinction (10pC or less) observed at (0.64 Vp)

7.11.6 Working Group on C57.13 Revision – Tom Nelson

The working group met on March 9, 2004. There were 6 members and 10 guests present. Tom Nelson was unable to attend so Ross McTaggart took his place. The minutes of the Pittsburgh meeting were approved with 1 exception: the Partial Discharge presentation by C. TenHaagen was not attached. An updated version will be attached to the minutes from this meeting.

Status report on the reaffirmation of C57.13 and revised draft C57.13D4

The Standard has now been re-affirmed. It was noted that this re-affirmation was necessary to ensure that it would not be withdrawn, even though a revised draft has passed through the WG and is ready for balloting. Fifty-five comments were received on the re-affirmation ballot. RM will confirm that the new PAR has been issued after the re-affirmation.

Discussion of Comments from Re-affirmation Ballot

The comments from the re-affirmation ballot were reviewed and compared with the new draft (D04). Most of the technical comments have already been addressed in D04, the main exception being the references to 50 hz. Although some South American Utilities may be using IEEE Standards for 50 hz, this is the exception to the rule. We will try to incorporate the ones that were not addressed in the Draft(where agreed upon) as well as the editorial comments in the new document before balloting. If this is not possible, the authors of the comments may have to re-submit. The problems with figure 6 are being addressed by Tom Nelson. List of comments attached

De-magnetization Procedure

Vladimir Khalin pointed out that the procedure in clause 8.2 c) method 3 does not work and should be removed. If the membership agrees after reviewing this, it should be taken out of the draft standard

7.11.7 Study Group IEEE Std C57.13.2 – Vladimir Khalin

Working Group met on Tuesday, March 9 at 3:15 PM with 12 members and guests present.

Minutes from the Pittsburgh meeting were approved.

Chair reported:

- PAR was approved.
- Draft D3 was uploaded and request for ballot pool formation was initiated.
- Invitations for the pool creation were distributed.
- Balance of participants was approved.
- Standard was MIA (It was not distributed for balloting by SA?)

The meeting adjourned at 4:00 PM.

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

Session was chaired by: **Harley Gilleland (PSIM) and Farnoosh Rahmatian (TC/ITSC)**

Attendees: K. Yule (G), V. Khalin (M), V. Nguyen (G), G. Morehart (G), L. Davis (M), M. Haas (G), C. Ten Haagen (G), D. Wagner (G), R. McTaggart (M), P. Canova (G), L. Recksiedler (G), V. Moreno (G), R. Gomez (G), D. Satpathi (M), A. Snyder (G), D. Makinson (G).

Minutes

- Opening comments were delivered by F. Rahmatian.
- Minutes of previous meeting, Oct 6, 2003, Pittsburgh, were reviewed.
- Update on other standards activities were given by F. Rahmatian and H. Gilleland:
- IEC 61850-9-2 and IEEE/UCA Guide for digital interface to instrument transformers
- PSRC ITF4 Working Group for Optical Sensor System Guide for Relaying
- CSA series (Canadian Standards)
- The format and table of content for the first draft of the Par P1601 were presented by F. Rahmatian:
- The format of IEEE C57.13.5 was used for the first draft.
- Various sections of the first draft were reviewed.

Actions :

- F. Rahmatian to publish the first draft (Rev. 1) of P1601 for comments by March 31, 2004.
- Reviewers, including corresponding working group members, to provide feedback on the first draft to F. Rahmatian by April 30, 2004.

- F. Rahmatian to publish a revised draft (Rev. 2) by May 30, 2004.
 - Working group will meet at the IEEE/PES General Meeting in June 6-10, 2004 in Denver to review and address comments received
 - H. Gilleland to check PAR expiry date.
 - D. Satpathi to review medium voltage dielectric test levels.
- Next Scheduled Working Group Meeting
 - IEEE/PES General Meeting, June 2004, Denver, CO (see [Denver 2004 IEEE General Meeting](#))

7.12 Insulating Fluids SC – Frank Gryszkiewicz, Chair; R.K. Ladroga, Vice-Chair

7.12.1 Introduction/Attendance

The Insulating Fluids Subcommittee met in San Diego, California on Wednesday, March 10, 2004 with 20 members and 20 guests present. One guest requested membership on the Subcommittee.

7.12.2 Approval of Meeting Minutes

The Transformers Committee has received a letter of concern related to the attachment letter included with the last Insulating Fluids Subcommittee Meeting in Pittsburgh, Pennsylvania. The Committee Officers will review this concern with IEEE as a follow-up to its initial review with IEEE when this letter was presented for inclusion in the Minutes. Upon completion of that review, a decision will be made as to any changes and notifications needed related to the Minutes.

In view of the foregoing, the Minutes of the Pittsburgh meeting were approved with Exception noted to inclusion of the subject letter included with the Insulating Fluids Subcommittee Minutes, subject to review with IEEE, and final determination of the status of this item in the Minutes.

7.12.3 Subcommittee Membership

There were no changes to report in the Subcommittee Roster; however, one guest requested membership on the Subcommittee. The new member is Mr. Kjell Sundhuist of Nynas Naphthenics, AB.

7.12.4 Current Subcommittee Business

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

Jim Thompson and T.V. Oommen are the Co-Chairs of this Working Group. The Working Group met on Tuesday, March 9, with a combination of 43 members and guests in attendance. The Working group reviewed Draft 2 of the suggested revision of Section 4.5. Several suggestions for changes were proposed. These comments will be incorporated into Draft 3, which will be sent out for a Subcommittee Survey Ballot before the next meeting.

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

This Working Group is Co-chaired by Frank Heinrichs and Frank Gryzkiewicz. This document completed a Standards Association Ballot some time ago and several negative ballots were received. The negative ballots were resolved and/or rebutted and incorporated into Draft 11C.

A Standards Association Ballot will be conducted on Draft 11C. This will be the first electronic ballot of this document. The Working Group also agreed to participate with IEEE Headquarters in an experimental procedure. Any negative ballots will be resolved or rebutted via a website based and teleconferencing procedure.

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

This Working Group is co-chaired by Frank Heinrichs and Frank Gryzkiewicz. Draft 14 of this document has been sent to IEEE for a Standards Association Ballot.

7.12.4.4 C57.111 – IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers

Kent Haggerty and Jim Goudie are the Working Group Co-Chairs. A successful Standards Association Reaffirmation Ballot was completed in September of 2003 and the IEEE Standards Board at their December 2003 meeting approved the document.

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

Rick Ladroga resigned as the Working Group Chair for this project due to his work responsibilities. The Subcommittee Chair thanked Rick for his work during his tenure as Working Group Chair. Fredi Jakob agreed to take over as Working Group Chair of this project.

The Working Group met on Tuesday, March 9, with a combination of 42 members and guests in attendance. The follow new members were added to the Working Group.

Don Chu	Tommy Spitzer
George Forrest	Robert Tillman, Jr.
Jack Hammers	Dave Wallach

In the past, the Working Group had a difficult time agreeing on dissolved gas analysis (DGA) limits for the different design load tap changers. In view of the foregoing, it was decided to use “generic limits” of the combustible gases of interest for the various design types of load tap changers. It was proposed that a table be formulated as follows.

- A. Normal Values
- B. Caution Values
- C. Warning Values

If the Normal Values were exceeded, ratios of the various combustible gasses would be used to determining whether the DGA data is indicative of a tap changer problem. The ratios discussed were Ethylene/Acetylene, Ethane/Methane, and Ethylene/Ethane.

The Working Group will prepare a new draft, which will be discussed at the next meeting.

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

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

Jim Goudie and Bill Bartley are the Working Group Co-Chairs of this project. A Standards Association Ballot is in the process of being conducted.

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

Patrick McShane is the Working Group Chair. The Working Group met on Tuesday, March 9, with 6 members and 44 guests in attendance. The following 10 requested membership on the Working Group.

Bill Chiu	Jerry Murphy
Larry Dix	Scott Reed

George Forrest
Rowland James
Brian Kloponski

Randy Rensi
Chris Rega Rochling
Barry Ward

Prior to the Working Group meeting, Donald Fallon, Vice Chair of the Transformers Committee, advised that IEEE received a letter regarding a document and disclosure of intellectual property at the last Working Group and Insulating Fluids Subcommittee meetings. This subject was discussed in Section 10.6.2 above and is under review by IEEE.

The Working Group meeting was then called to order by the WG Chair, Patrick McShane. As required in the IEEE Standards Board By-law, Section 6.3.2, the Chair reminded the WG members that they are required to disclose any intellectual property patents or pending patents that “may be essential” to the standard development.

The Working Group reviewed Draft 2A, through Clause 4, of the Guide.. The comments received will be incorporated into Draft 3 for the next meeting.

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

The Working Group Chair is Patrick McShane. A successful Standards Association Reaffirmation Ballot was recently conducted and the document will be sent to the IEEE Standards Board for approval.

7.12.4.9 Adjournment

The Subcommittee adjourned at 12:00 noon.

7.12.4.10 Next Meeting

The Insulating Fluids Subcommittee and its Working Groups will next meet in Las Vegas, Nevada during the period of October 17-21, 2004.

8.0 Editor’s Report – Stephen Antosz

Steve presented a report which was prepared by Mark Christini:

Between April 2003 and October 2003, a total of (41) papers and in the transformer area (25 new and 16 revised) were submitted to IEEE Transactions on Power Delivery. During this time (29) reviews were completed and (12) reviews are in-progress. For completed reviews, the recommendations were: Accept without changes (12), Revise and Resubmit (11), and Reject (6). A complete summary of these papers is listed below.

I would like to thank all of the reviewers who volunteered for this effort and donated many hours of their time over that past three years. I sincerely appreciate your time and effort.

Mark Christini

Editor, IEEE Transactions on Power Delivery

Accept without changes:

TPWRD-00390-2002.R2	IMPROVED INSERT GEOMETRY FOR REDUCING TANK WALL LOSSES IN PAD-MOUNTED TRANSFORMERS	Olivares
TPWRD-00012-2003.R1	An Evidential Reasoning Approach to Transformer Condition Assessments	Tang
TPWRD-00015-2003.R1	Deriving an Equivalent Circuit of Transformers Insulation for Understanding the Dielectric Response Measurements	Saha
TPWRD-00039-2003.R2	Estimation of the Hottest Spot Temperature (HST) in Power Transformers Considering Thermal Inhomogeneity of the Winding	Pradhan
TPWRD-00056-2003.R1	Sensitive online PD-Measurements of on site Oil/Paper-insulated Devices by means of optimized Acoustic Emission Techniques (AET)	Grossmann
TPWRD-00072-2003.R1	Development of a DC Current-Blocking Device for Transformer Neutrals	Bolduc
TPWRD-00104-2003.R2	Fault Diagnosis of a Power Transformer Using an Improved Frequency Response Analysis	Kim
TPWRD-00127-2003.R1	Power Transformer Temperature Evaluation for Overloading Conditions	Jardini
TPWRD-00130-2003.R3	Efficient Operation Regions of Power Distribution Transformers	Yang
TPWRD-00278-2003	Analysis of a Ferro-Resonant Circuit Using Bifurcation Theory and Continuation Techn	Zhou
TPWRD-00301-2003.R1	Dynamic Thermal Modelling of Power Transformers	Susa
TPWRD-00367-2003	A Controllable Reactor of Transformer Type	Tian

Revise and Resubmit:

TPWRD-00039-2003.R1	Estimation of the Hottest Spot Temperature (HST) in Power Transformers Considering Thermal Inhomogeneity of the Windings	Pradhan
TPWRD-00104-2003.R1	Fault Diagnosis of a Power Transformer Using an Improved Frequency Response Analysis	Kim
TPWRD-00130-2003.R1	Efficient Operation Regions of Power Distribution Transformers	Yang
TPWRD-00130-2003.R2	Efficient Operation Regions of Power Distribution Transformers	Yang
TPWRD-00177-2003	Specifying Transformer Winter and Summer Peak-load Limits	Li
TPWRD-00240-2003	A Neutral Resistor Based Technique For Transformer Inrush Current Reduction, Part I: Simulation and Experimental Results	Xu
TPWRD-00241-2003	A Neutral Resistor Based Technique For Transformer Inrush Current Reduction, Part II: Theoretical Analysis and Design Guide	Xu
TPWRD-00289-2003	Improvement of the Cooling Process of Oil Immersed Electrical Transformers Using Heat Pipes	Rosas
TPWRD-00301-2003	Dynamic Thermal Modelling of Power Transformers	Susa
TPWRD-00339-2003	A Complete Transient Model for Three Phase Power Transformers Using a Wavelet Filter Bank	Saleh
TPWRD-00375-2003	A Transformer Transfer Voltage Simulation Method Based on Approximate Frequency Characteristic Curves	Funabashi

Reject:

TPWRD-00066-2003.R1	Experimental Investigation of Internal Short Circuit Faults Leading to Advanced Incipient Behavior and Failure of a Distribution Transformer	Butler-Purry
TPWRD-00185-2003	Transformer Design Considering Restrained Inrush Current Based on Four-Layer Structure	Cheng
TPWRD-00227-2003	IR Thermographic Condition Monitoring of Power Transformers using Statistical and Neural Network techniques	Willis

TPWRD-00261-2003	Dissolved Gas Analysis Using Evidential Reasoning with Fuzzy Sets	Spurgeon
TPWRD-00264-2003	Application of Self-Organizing Map(SOM) to Prediction of Oil Temperature of a Substation Transformer	Ohkita
TPWRD-00381-2003	Intershielded Disc Windings in Power Transformers	Ryder

Still In Progress:

TPWRD-00339-2003.R1	A Complete Transient Model for Three Phase Power Transformers Using a Wavelet Filter Bank	Saleh
TPWRD-00346-2003	DERATING OF TRANSFORMERS FOR OPERATION UNDER EXTREME WEATHER CONDITIONS IN NETWORKS HAVING OTHER VOLTAGE AND/OR FREQUENCY RATINGS	Saied
TPWRD-00404-2003	Electromagnetic and acoustic emissions to diagnose complex electrical and mechanical structures	Muzi
TPWRD-00412-2003	A moisture-in-oil model for power transformer monitoring. Part II: Experimental verification	García
TPWRD-00413-2003	A moisture-in-oil model for power transformer monitoring. Part I: Theoretical Foundation	García
TPWRD-00414-2003	Measured Transformer Derating and the Comparison with IEEE C57.110	Najdenkoski
TPWRD-00433-2003	An Effort to Understand What Factors Affect the Transfer Function of a Two-Winding Transformer	Satish
TPWRD-00455-2003	Transformer Modeling for Low- and Mid-Frequency Transients – The State of the Art	Martinez

Editor's Report – Spring 2004 San Diego Meeting

Between October 2003 and March 2004, a total of (20) papers and in the transformer area were submitted to IEEE Transactions on Power Delivery (6 new, 14 revised). During this time (18) reviews were completed and (2) reviews are still in-progress. For completed reviews, the recommendations were: Accept without changes (12), Revise and Resubmit (1), and Reject (5).

A complete summary of these papers is listed below.

I would like to thank all of the reviewers who volunteered for this effort and donated many hours of their time over the past 3 years. Over 145 different reviewers completed a total of 440 reviews. For the submitted papers, 70% were accepted while 30% were rejected. In particular, I would like to especially acknowledge the following reviewers who completed (8) or more reviews for me over the past three years:

<i>Reviewer</i>	<i>No. Papers</i>
<i>Linden Pierce</i>	<i>20</i>
<i>Bob DeIVecchio</i>	<i>16</i>
<i>Jin Sim</i>	<i>12</i>
<i>Bob Degeneff</i>	<i>11</i>
<i>Y.C. Huang</i>	<i>11</i>
<i>L. Satish</i>	<i>11</i>
<i>Jerry Corkran</i>	<i>10</i>
<i>Chung-Duck Ko</i>	<i>10</i>
<i>Hasse Nordman</i>	<i>10</i>
<i>Jan Declercq</i>	<i>9</i>
<i>Gustav Preininger</i>	<i>9</i>
<i>Tord Bengtsson</i>	<i>8</i>
<i>John Brauer</i>	<i>8</i>
<i>Jack Harley</i>	<i>8</i>
<i>Peter McKenny</i>	<i>8</i>
<i>Bob Nevins</i>	<i>8</i>

Mark Christini

Editor, IEEE Transactions on Power Delivery

Accept without changes

TPWRD-00177-2003.R1	Specifying Transformer Winter and Summer Peak-load Limits	Li
TPWRD-00240-2003.R1	A Neutral Resistor Based Technique For Transformer Inrush Current Reduction, Part I: Simulation and Experimental Results	Xu
TPWRD-00241-2003.R1	A Neutral Resistor Based Technique For Transformer Inrush Current Reduction, Part II: Theoretical Analysis and Design Guide	Xu
TPWRD-00339-2003.R3	A Complete Transient Model for Three Phase Power Transformers Using a Wavelet Filter Bank	Saleh
TPWRD-00412-2003.R1	A moisture-in-oil model for power transformer monitoring. Part II: Experimental verification	García
TPWRD-00413-2003.R1	A moisture-in-oil model for power transformer monitoring. Part I: Theoretical Foundation	García
TPWRD-00433-2003.R1	An Effort to Understand What Factors Affect the Transfer Function of a Two-Winding Transformer	Satish
TPWRD-00455-2003.R1	Transformer Modeling for Low- and Mid-Frequency Transients – The State of the Art	Martinez
TPWRD-00465-2003.R1	Analysis of Ultrasonic Signal by Partial Discharge and Noise from the Transformer	Kweon
TPWRD-00492-2003.R1	Voltage sag effects on three-phase transformers	Sainz
TPWRD-00507-2003.R1	Experimental Studies on the Use of MOV in Transformer Windings Inner Protection	Zhou
TPWRD-00563-2003.R1	An Efficient Method to Compute Transfer Function of a Transformer from its Equivalent Circuit	Satish

Revise and Resubmit

TPWRD-00375-2003.R1	A Transformer Transfer Voltage Simulation Method Based on Approximate Frequency Characteristic Curves	Funabashi
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Reject

TPWRD-00346-2003	DERATING OF TRANSFORMERS FOR OPERATION UNDER EXTREME WEATHER CONDITIONS IN NETWORKS HAVING OTHER VOLTAGE AND/OR FREQUENCY RATINGS	Saied
TPWRD-00404-2003	Electromagnetic and acoustic emissions to diagnose complex electrical and mechanical structures	Muzi

TPWRD-00414-2003	Measured Transformer Derating and the Comparison with IEEE C57.110	Najdenkoski
TPWRD-00464-2003	Fuzzy-Neural Power Transformer Diagnostic System with Auto-Generation of Fuzzy Rules	Chang
TPWRD-00591-2003	Supervised and Unsupervised Neural Networks Used in the Classification and Diagnosis of Transformer Oil	Mokhnache

Still In Progress

TPWRD-00375-2003.R1	A Transformer Transfer Voltage Simulation Method Based on Approximate Frequency Characteristic Curves	Funabashi
TPWRD-00634-2003	Study of Parameter of Tripler Using Finite Element Method of Harmonic Balance	Wang

All members of the IEEE Transformer Committee are invited to review technical papers. To review IEEE Transaction Papers on transformers, please sign up at: <http://tpwr-d-ieee.manuscriptcentral.com/>

INSTRUCTIONS FOR SIGNING UP TO REVIEW IEEE TRANSACTIONS PAPERS

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

13a: Power and Instrument Transformers

13b: Insulating fluids category

13c: Dielectric Testing

13d: Audible Noise and Vibration

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

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

The SC meeting began at 3:00 p.m., Wednesday, March 10, 2003 at the Catamaran Resort Hotel, in San Diego, California, USA. Twenty-two (22) people were in attendance. Greg Anderson, SC Chair facilitated. The meeting began with introductions by the attendees.

9.1 Committee Finances

Committee funds are presently \$10,982.69 (as of February 9, 2004). Greg thanked the Meeting Hosts for working hard to control expenses and help with stewardship of the Committee's funds.

9.2 Past & Present Meetings

9.2.1 Past Meeting - Pittsburgh, Pennsylvania, USA (October 5-9, 2003)

Dennis Blake and the Pittsburgh Host Team at Pennsylvania Transformers (PTTI) did a great job of planning and implementing the meeting. A special thanks to Judy Panian and Cal Olsen of PTTI for their hard work.

9.2.2 Present Meeting - San Diego, California, USA (March 7-11, 2004)

Earl Harris from San Diego Gas & Electric gave a brief report on the on-going meeting. It was noted that Earl (who never attended a Committee meeting!) took on a big task when Ron Kirker left SDG&E in December. Attendance was good at the meeting with 346 attendees and 74 companions/spouses.

The speaker for our Tuesday Luncheon (192 attendees) was Mr. James E. Tucker, Senior Engineer in SDG&E's Electric Meter Department. Mr. Tucker gave us a challenging presentation titled "Happiness is a Choice" and provided some tips on how to find the "funny in

life" with our own sense of humor. On Monday, 79 people participated in a working luncheon where Bill Chiu, our new Standards Coordinator reviewed the procedures in developing standards. This event continues to be very well accepted.

On Wednesday evening, 259 people boarded the William D. Evans, an nineteenth-century-style paddlewheeler, at the Catamaran pier and enjoyed dinner and lively music provided by a jazz trio, the Grand Daddy-O's. On Monday, 53 companions/spouses enjoyed Shopping in La Jolla, a visit to the Cabrillo National Monument and lunch in Seaport Village. On Tuesday, 50 companions/spouses enjoyed a tour of Coronado including a visit to the historic Hotel del Coronado, and San Diego's Old Town State Park with lunch in Old Town.

On Sunday morning, approximately 95 people toured the SCE/Edison ESI Repair Facility (a restricted tour, by invitation only). On Tuesday evening, 57 people toured SDG&E's Electric Distribution Operations Center (non-restricted tour).

Special thanks to Tamini Transformers, Tree Tech USA, Luxtron Corporation, and ABB Inc. for sponsoring coffee breaks at this meeting and helping us defray the cost of the meeting.

9.3 Future Meetings

9.3.1 Summary

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

- March 13-17, 2005 -- Jackson, Mississippi, USA at the Hilton Jackson. Hosted by Andy Speegle and Kuhlman Electric.
- October 23-27, 2005 -- Memphis Tennessee. Hosted by Randy Williams and ABB Inc.

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

9.3.2 Upcoming Fall 2004 Meeting (October 24-28) -- Las Vega, Nevada, USA

Due to the recent cancellation of the Scotland Meeting, meeting details were not available yet. A meeting site was not yet determined but several hotels were being investigated. Due to uncertain weather conditions in Scotland, the Fall Meeting was originally planned in September, but it was decided to move it back into the traditional month of October.

9.3.3 Upcoming Spring 2005 Meeting (March 13-17) -- Jackson, Mississippi, USA

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

9.4 Working Group Report

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

The working group meeting was held at 7:00 am on Wednesday, March 10, 2004. In spite of its early hour, the meeting was well-attended.

9.4.2 Latest Changes

The only real change to the web site is that addition of a search engine. The search engine allows users to find information on the web site by searching using key words or phrases.

Ownership of the SC web pages and WG pages by their chairs was again stressed. Templates for creating new pages have been developed for the WG Chairs to use. The template is available in both MS Word and Adobe Acrobat format. The template is available on the Main Subcommittee page.

9.4.3 Other Issues

The main topic of discussion was the desire to make the website the "Go To" place for presentations, communications and general information on transformers.

A "brainstorm session" to come up with various ideas for the website development was held. A question was raised concerning whether access to information should be public or private domain. There is a private portion of the web site, which is used for posting draft standards and other sensitive information (photos, member directory, etc.) There was also some discussion of copyright issues. Greg Anderson clarified that as long as permission was granted by the author or owning entity, the paper could be published in the public domain. Also abstracts and summaries of papers could be posted for non-public or restricted papers with information on how to gain access or permission to get the original paper or information.

Greg Anderson brought up some new business on spam e-mails and viruses. Greg wants to preserve the IEEE alias system and he encouraged people not to drop their alias email address. He indicated that no company is without spam and virus problems and that spam will not decrease significantly in the future. The IEEE alias system has a good "spam filter" that blocks spam emails and filters viruses. He indicated that a good amount of his and other committee leaders time were spent revising contact information in the databases. Use of an alias email

address keeps the amount of changes to a minimum as it your alias allows your e-mail to follow you in the event of a job change or company domain change.

Greg Anderson mentioned that he has been talking with a company that provides a web-based membership list. The good part about a membership list is that it will have a hierarchy to it so that subcommittee chairs can look at membership list and see who is in their subcommittee or working group. The chair could then send a message to that person's email. The software also handles meeting registration. It will allow working groups to print a roster. He is also hoping to eventually have a barcode reader that could be passed around during meetings and during the Main Committee meeting to simplify.

The new password for the private directories was announced, which will be effective starting Friday, March 12th.

The meeting was adjourned.

9.5 New Business

9.5.1 Tutorials/Presentations

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

The following panel discussions were presented at the meeting:

- "Proposed Test to Determine Zo for Transformers with Interconnected Windings",_by G. Rosselli
- "Transportation Issues of Power Transformers", by T. Lundquist, W. Hoffmann, E. Schweiger, M. Silvestre
- "Seismic Design Considerations for Transformers", by H. Matt, D. Ostrom, C. Riker
- "Moisture Estimation in Transformer Insulation", by T. Oommen, J. Thompson, B. Ward

Future candidate presentations include: Net Meetings (On-line Meetings and Remote Conferencing), Web-based Review of PES Technical Papers, IEEE Virtual Communities, Loss Tolerance & Measurement (by Ramsis Girgis), Noise and Sound Measurements, Paralleling Transformers, and National Energy Policy (by Phil Hopkinson).

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

At the San Diego and Pittsburgh Meetings, we experimented with recording the presentations with a program called "Camedia". This application runs in the background of a MS-Powerpoint presentation, creating a .MOV file, while recording in real-time the voice of the presentation over the slide presentation. We will continue to experiment with this program.

9.5.3 Coffee Break Sponsors

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

9.5.4 Committee Historians

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

9.6 Miscellaneous

Additional topics were discussed and reviewed:

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

We are still investigating a way of consolidating our membership databases together with an on-line meeting registration system. Greg has been looking at several outside companies that provide such a service and is focusing on one company. We presently maintain and use several non-relational databases: the Committee "mailing list" maintained by SC Secretary, the attendee list for each meeting, the standards ballot lists, and individual membership lists maintained by SC & WG chairs. It would be helpful if databases used by the Committee were relational, centrally-located, and the contact information was self-maintained by the members. Greg has started writing specifications for such a service and it is hopeful that a decision will be made in the next few months.

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

The 2001 9/11 event and the depressed economy have affected our meeting attendance and participation. We need to develop a contingency plan and look for opportunities to continue work during such situations. We need to learn to work more efficiently between normal scheduled Committee meetings. Greg suggested that one WG or TF plan and hold a "between meeting" Internet or telephone conference and report the results (how it went, etc) to the Committee at a future meeting. We will continue to consider a WG or TF project that would be a candidate to hold a mid-meeting on-line conference.

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

The meeting was adjourned.

10.0 Reports of Liaison Representatives

10.1 SCC4 - P. A. Payne

No Standards coordinating Committee No. 4 (SCC4) activities to report at this meeting.

10.2 TC 14 TAG - P. J. Hopkinson (Scott Choinski rep.)

U.S. National Committee of the International Electrotechnical Commission,

A Committee of the American National Standards Institute

Technical Advisory Group for IEC TC 14

TAG Administrator:

National Electrical Manufacturers Association

1300 North 17th Street, Suite 1847, Rosslyn, VA 22209

Tel: 703-841-3253, fax: 703-841-3353

MINUTES

PLACE OF MEETING:	THE CATAMARAN RESORT HOTEL 3999 Mission Boulevard San Diego, CA 92019
DATE AND TIME:	Wednesday, March 10, 2004 3:00 PM
PRESIDING OFFICER:	P. Hopkinson, Technical Advisor

Members Present:

D. Aho	Cooper Power Systems
*C. Colopy	Cooper Power Systems
J. Corkran	Cooper Power Systems
J. Foldi	Consultant
D. Foster	Olsun Electronics Corporation
P. Hopkinson	Hvolt, Inc.
S. Kennedy	Niagara Transformer Corporation
J. Lackey	Lackey Transformer Services
R. Marek	Dupont Advanced Fibers Systems
P. Payne	PEPCO
H.J. Sim	Waukesha Electric Systems

Members Absent:

R. Girgis	ABB
C. Ko	Lapp Insulator Company
G. Morehart	ACME Electric Corporation

Others present:

S. Choinski	NEMA Staff, TAG Administrator
M. Iman	MGM Transformer
J. Kelly	S.D. Myers, Inc., TC10 TAG
A. Molden	AMEESCO
H. Nordman	ABB, Finland
P. Riffon	Hydro-Quebec
S. Schappell	Waukesha Electric
B. Simpson	Innovative Paper Technologies
R. Wicks	DuPont
J. Wiseman	Schneider Electric

K. Yule

Bechtel

H. Zarmandilly

Schneider Electric

* Part-time participant

1. CALL TO ORDER

The meeting was called to order, 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 8, 2003 was approved as written.

5. REVIEW AND UPDATE OF USNC ROSTERS FOR TC 14

Members reviewed the TAG roster and made necessary corrections.

Requirements for TAG membership are US citizenship, and payment of \$250 participation fee. TAG Administrator maintains the roster and submits updates to USNC. The USNC notifies the TAG Administrator of payment status for follow up with those not paying. TAG meetings are open to all interested parties and comments are welcome. Only TAG members have official votes, and are eligible to be US delegates at meetings and experts to Working Groups.

The TAG should consider appointing a Resource Expert. Each TAG is permitted to designate, each year, one individual as a "RESOURCE EXPERT" for the TAG. The Resource Expert should be an individual whose knowledge and expertise are deemed vital for the TAG's work, and is unable to obtain the needed funding for TAG membership from their employer or other sources. This Resource Expert shall be exempt from paying the annual Fee.

Bill Simpson to be added to the TAG roster as Liaison from TC 98.

6. REAPPOINTMENT OF TA

Phil Hopkinson was reappointed TA, and his term expires January 2008

7. PREPARE FOR TC 14 PLENARY MEETING

7.1 Meeting to be held March 23-24, 2004, in Frankfurt, Germany. The Working Group meetings were cancelled

7.2 *Review US Delegation*

The US Delegation will consist of Phil Hopkinson, Chief Delegate; David Aho; Derek Foster; Jin Sim; and Scott Choinski

7.3 *Review Of Documents And Actions*

7.3.1 14/468/DTS - IEC TS 60076-14 Ed. 1: Guide for the design and application of liquid-immersed power transformers using high-temperature insulation materials

The USNC recommended approval with comment. Rick Marek briefed the members on the development of this standard. It is a Tech Spec and did not have to go through the full IEC process. This is similar to an IEEE Trial Use Standard. The standard will be monitored for a year and a half to determine the next steps for the document. TC 14 and TC 98 have a Joint Working Group to work on insulation systems.

7.3.2 14/469/DC - IEC 60599: Mineral oil-impregnated electrical equipment in service - Guide to the interpretation of dissolved and free gases analysis - IEC/TC 10

14/475/INF – Compilation of Comments on 14/469/DC

USNC supported Option B in Table 1 and Option E in Table 2. They are closest to the North American methodology referenced in IEEE C57.104. USNC vote

not received by IEC, however, our choices were the clear favorite of the countries responding.

7.3.3 14/473/RVC – Voting result on 14/463/CDV: 60214-2 Ed. 1: Tap changers - Part 2: Application guide

Document was approved. Craig Colopy and Tom Traub have done a lot of work on this standard.

7.3.4 14/476 - FDIS - 60076-11 Ed. 1: POWER TRANSFORMERS - Part 11: Dry-type transformers

Recommended votes due to the TAG Administrator April 2, 2004 to make IEC closing date of April 23. This standard contains the “French fire test.” We are looking for a status report from the WG Convenor Mr. M Sacotte.

7.3.5 14/477/CC - Compilation of comments on 14/465/CD: IEC 60076-5 A1 Ed. 2: Power transformers - Part 5: Ability to withstand short circuit

USNC recommendation to approve received by IEC. A CDV is planned for issue in May. The French propose 100% short circuit testing, however we advocate compliance by calculation.

7.4 *Review Meeting Agenda*

7.4.1 14/472A/DA – Revised draft agenda

Documents to be discussed at the TC 14 meeting not covered in prior discussions:

7.4.1.1 MT 1 IEC 60076-7 revision of IEC 354 (Convenor Mr. Hasse Nordman)
IEC 60076-7: Ed 1 Loading guide for oil-immersed power transformers

7.4.1.2 MT 3 IEC 60076-6: Ed 1 Reactors (Revision of IEC 60289 Ed 3.0)
(Convenor Dr. Christoph Ploetner)

IEC 60076-6: Ed 1 Reactors

7.4.1.3 WG 21 Converter Transformers (Convenor Mr. G. Jorendal)

IEC 61378-3: Ed 1 Converter transformers - Part 3: Application guide

7.4.1.4 WG 25 Determination of transformer and reactor sound levels (Convenor,
Ms. Michelle Clark)

IEC 60076-10-1: Ed 1 Determination of transformer and reactor sound levels -
User guide

Document discusses how to determine sound levels but does not include levels to
meet. IEC tends to leave that as negotiable between buyer and seller. USNC will
continue to advocate NEMA TR-1 tables as recommended levels.

7.4.1.5 WG 27 Dry-type power transformers (Convenor Mr. M Sacotte)

IEC 60076-12 Loading guide for dry-type power transformers (Revision of IEC
905)

7.4.1.6 WG 28 Transformers with internal protection (Convenor Mr. M Sacotte)

IEC 60076-13: Self protected liquid filled transformers

7.4.1.7 WG 30 Gas-filled-type power transformers (Convenor Mr. K Toda)

IEC 60076-15: Ed 1 Gas-filled-type power transformers US opposed this WG

7.4.2 14/478/INF – Convenors Reports to the Meeting of TC 14 – Not
addressed.

7.4.3 14/479/INF – Requests for Liaisons for Consideration at the Meeting of
TC 14 – Not addressed.

8. REPORT ON TC 14 WORKING GROUPS

8.1 Working Group 26 – Tap Changers – This was covered during discussions on 7.3.3.

8.2 Working Group 29 – High Temperature Insulation Systems - This was covered during discussions on 7.3.1.

9. USNC SURVEY

Not addressed due to time constraints.

10. OTHER BUSINESS

Dual logo – IEEE may submit standards to IEC for acceptance as international standards. The reverse is not true. C57.131 – Tap Changers is mirroring the relevant IEC standard. TAG Administrator reported that there are ANSI Procedures for the National Adoption of IEC Standards as American National Standards. These procedures will be researched and reported at a future meeting.

11. DATE AND PLACE OF THE NEXT MEETING

The next meeting will be held in conjunction with the Fall IEEE PES Transformer Committee meetings, date and time TBD.

12. ADJOURN

The meeting adjourned at 4:25 PM.

Reported By:

S. Choinski

March 10, 2004

10.3 CIGRE – Jean-Christophe Riboud

There was no report presented.

11.0 Old Business

There were no items of old business raised for discussion.

12.0 New Business

There were no items of new business raised.

13.0 Adjournment

The meeting was adjourned at 9:50 AM.

Respectfully submitted,

Thomas A. Prevost
Secretary

Attachment 1 – Status Report of IEEE/PES Transformers Committee Standards

IEEE/PES TRANSFORMERS COMMITTEE Status Report of Standards

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: AUDIBLE SOUND & VIBRATION					
CHAIR: J. PURI					
C57.116	GUIDE FOR SOUND LEVEL ABATEMENT AND DETERMINATION IN OIL-FILLED TRANSFORMERS	Darwin, A.		9/21/2000	
NONE				2005	
SUBCOMMITTEE: BUSHING					
CHAIR: F. E. ELLROTT					
C57.19.00	GENERAL REQUIREMENTS AND TEST PROCEDURES FOR OUTDOOR APPARATUS BUSHINGS (IEEE 21)	Ellis, K. 615-847-2157	PSIM IA/PSE ICC	7/23/1991 6/20/1996 2004	Reaffirmed 1997, Std extended until 12/31/2004, PAR extended until 12/31/2004
C57.19.01	STANDARD PERFORMANCE CHARACTERISTICS AND DIMENSIONS FOR OUTDOOR APPARATUS BUSHINGS (IEEE 24)	Singh, P. 901-696-5228	ICC IA/PSE IEC SC36A	1/30/2000 2005	Revised Standard Approved 1/30/2000
C57.19.03	STANDARD REQUIREMENTS, TERMINOLOGY AND TEST CODE FOR BUSHINGS FOR DC APPLICATIONS	Ellis, F. E. 360-619-6099		6/20/1996 2/27/2004 2007	Reaffirmed 12/11/2002 New PAR for Corrigendum 1
C57.19.100	GUIDE FOR APPLICATION OF APPARATUS BUSHINGS	Ellis, F. E. 360-619-6099	SWGR SUB PSH	3/16/1995 2008	Reaffirmed 12/10/03 NEW TASK FORCE
NEW	TASK FORCE TO STUDY APPLICATION AND PROBLEMS OF DRAW-LEADS FOR BUSHINGS	Noelmaa Rees 414-547-0121			

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: DIELECTRIC TESTS					
CHAIR: L. B. WAGENAAR					
C57.113	GUIDE FOR PARTIAL DISCHARGE MEASUREMENT IN LIQUID-FILLED POWER TRANSFORMERS AND SHUNT REACTOR	Perkins, M. 314-382-2100	PSIM IAS/PSE IEC TC14 U	12/5/1991	Reaffirmed 12/11/2002
NONE				2007	
C57.127	GUIDE FOR THE DETECTION OF ACOUSTIC EMISSIONS FROM PARTIAL DISCHARGES IN OIL-IMMERSED POWER TRANSFORMERS	Harley, J. W. 216-425-1838		9/21/2000 2/13/2003 2005	Has been granted Full-Use status New PAR Active - Expires 12/31/2007
C57.138	RECOMMENDED PRACTICE FOR ROUTINE IMPULSE TEST FOR DISTRIBUTION TRANSFORMERS	Rossetti, J. 901-528-4743	T&D IA/PSE PSIM	3/19/1998 9/19/1996 2004	Reaffirmation in process. Std extended to 12/31/04 Reaff' ballot closed 11/9/2003, 100% affirmative
C57.98	IEEE GUIDE FOR TRANSFORMER IMPULSE TESTS	Madden, A. 845-225-0993	NONE	12/2/1993 9/12/2002 2006	WG Active on Revision PAR Expires 12/31/2006

3/6/2004

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS	3/6/2004
SUBCOMMITTEE: DISTRIBUTION TRANSFORMERS						
CHAIR:	E. SMITH					
C57.12.20	OVERHEAD-TYPE DISTRIBUTION TRANSFORMERS, 500 KVA AND SMALLER, HV 34500 VOLTS AND BELOW, L.V. 7570/13800Y &	Andersen, G.		6/20/1996 12/6/2001 2005	PAR Expires 12/31/2005	
C57.12.21	Requirements for Pad-Mounted Compartmental-Type Self-Cooled Single-Phase Distribution Xfmr w/HV Bushing			5/7/1992	NEMA/ANSI Document	
C57.12.22	Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Xfmr, with HV Bushings			7/1/1993	NEMA/ANSI Document	
C57.12.23	UNDERGROUND-TYPE SELF-COOLED, 1-PHASE DISTRIBUTION TR WITH SEPARABLE INSULATED HV CONNECT HV 24940Gedy L.V.240...167KVA,	Traut, A.	T&D IC IAS/PSEC	6/13/2002 2007	Revised Standard approved June 2002 Supersedes C57.12.23-1992	
C57.12.25	REQUIREMENTS FOR PAD-MOUNTED COMP. TYPE SELF-COOLED, 1-PHASE DISTRIBUTION TR W/SEP INS HV CONN, HV 34500Gedy...167KVA...	Ghafura, A.	T&D IC IAS/REPC	5/1/1990 12/8/1998 1995	Recalculating Ballof PAR extended until 12/31/2004	
C57.12.26	PM Comp Type Self-Cooled Three-Phase Distribution Xfmr for Use with Separable Insulated High Voltage Connectors	731-285-9121		6/18/1992	IEEE Document, Rev of ANSI C57.12.26-1987	
C57.12.28	Standard for Pad Mounted Equipment - Enclosure Integrity	Olen / Mulkey 262-835-3362		5/9/2002	New Std. WG Active PAR Expires 12/31/2006	
C57.12.29	Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments	Olen / Mulkey 262-835-3362		5/9/2002	PAR Expires 12/31/2006	
C57.12.31	Standard for Pole Mounted Equipment - Enclosure Integrity	Olen / Mulkey 262-835-3362		9/12/2002 2007	New Std Approved 9/12/2002	
C57.12.32	Standard for Submersible Equipment - Enclosure Integrity	Olen / Mulkey 262-835-3362		9/12/2002 2007		
C57.12.33	GUIDE FOR EVALUATION OF LOSSES IN DISTRIBUTION TRANSFORMERS	Pekarek, T.	PSIM	6/25/1998	PAR extended until 12/31/2004	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: DISTRIBUTION TRANSFORMERS					
CHAIR: E. SMITH					
CS7.12.34	REQUIREMENTS FOR THREE PHASE PAD-MOUNTED DISTRIBUTION TRANSFORMERS	Shall, Stahara 417-625-5100	KCC	9/21/1995	D10 Reballist to close on 3/4/2004 PAR Extended until 12/31/2004
CS7.12.35	STANDARD FOR BAR CODING FOR DISTRIBUTION TRANSFORMERS (POLE-MOUNTED, PAD-MOUNTED AND UNDERGROUND)	Henry, G.		6/20/1996	Need Raffleirmison by 12/31/2004
CS7.15	REQUIREMENTS, TERMINOLOGY, & TEST CODE FOR STEP-VOLTAGE REGULATORS	Kennedy/Colopy	SUBS IAS/PSE	9/16/1999 12/7/2000 2004	WG Active PAR Expires 12/31/2004
IEEE1388	STANDARD FOR THE ELECTRONIC REPORTING OF TRANSFORMER TEST DATA	Callen/Hollingswer 601-892-4661		12/7/2000 10/1/2001 2005	WG Active, Ballot Prod Approved 1/6/2004 Revising, will publish as C57.12.37

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: DRY-TYPE TRANSFORMERS					
CHAIR: C. JOHNSON					
C57.12.01	GENERAL REQUIREMENTS FOR DRY-TYPE DIST. AND POWER TR INCL THOSE WITH SOLID CAST and/or RESIN-ENCAPSULATED WINDINGS	Sullivan, J. 813-228-4111	NEMA IA/IR/CRPS U.L. ANSI	9/16/1998 3/18/1999 2005	Ballooning, Std. Extended to 12/31/2005 PAR Expires 12/31/2005
C57.12.50	REQ. FOR VENTILATED DRY-TYPE DISTRIBUTION TR, 1-500kVA, 1 PHASE, AND 15-500kVA, 3-PHASE HV 601-34500 VOLTS, LV 120-600V	Sullivan, J. 813-228-4111		6/12/1989	Need PAR for revision to get IEEE status
C57.12.51	REQ. FOR VENTILATED DRY-TYPE POWER TR, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208V/120 TO 4160 VOLTS	Sullivan, J. 813-228-4111		1994	Need PAR for revision to get IEEE status
C57.12.52	REQ. FOR SEALED DRY-TYPE POWER TRANSFORMERS, 501kVA & LARGER, 3 PHASE, WITH HV 601-34500V, LV 208V/120 TO 4160 VOLTS	Sullivan, J. 813-228-4111		1994	Need PAR for revision to get IEEE status
C57.12.53	REQUIREMENTS FOR DRY-TYPE UNDERGROUND, SINGLE-PHASE WITH SEPARABLE INSULATED HV 24940 gndV/14400 V			0	ONLY TITLE EXIST (NO PAR) IS IT REQUIRED?
C57.12.54	REQUIREMENTS FOR DRY-TYPE UNDERGROUND 3 PHASE DISTRIBUTION TRANSFORMERS, 2500 kVA OR \leq , HV 24940 gndV/14400 OR \leq LV 480V			0	ONLY TITLE EXIST IS IT REQUIRED?
C57.12.55	CONFORMANCE STANDARD FOR TR- DRY-TYPE TRANSFORMERS USED IN UNIT INSTALLATIONS, INCL UNIT SUBSTATIONS	Sullivan, J. 813-228-4111		4-7/1986	NEMA/ANSI Document
C57.12.56	TEST PROCEDURE FOR THERMAL EVALUATION OF INSULATION SYST FOR VENTILATED DRY-TYPE POWER & DISTRIBUTION TRANSFORMERS	Provost, WICKS 302-999-2225		1992 12/17/1981	Need PAR for revision to get IEEE status Reaffirmed in 9/16/1998
C57.12.58	GUIDE FOR CONDUCTING TRANSIENT VOLTAGE ANALYSIS OF A DRY-TYPE TRANSFORMER COIL	Payne, P. 202-388-2138	IEC IAS	2007 6/27/1991	WILL COMBINE WITH C57.12.60 Reaffirmed 6/13/2002
C57.12.59	GUIDE FOR DRY-TYPE TRANSFORMER THROUGH-FAULT CURRENT DURATION	Payne, P. 202-388-2335		2007 12/6/2001	Revision approved 12/6/2001
C57.12.60	TEST PROCEDURES FOR THERMAL EVALUATION OF INSULATION SYSTEMS FOR SOLID-CAST & RESIN ENCAP POWER & DIST TRANSFORMER	Provost, WICKS 302-999-2225	IEC SC15E NEMA	2006 3/19/1998 12/10/2003 2007	New PAR; WG Active Combining with C57.12.56

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: DRY-TYPE TRANSFORMERS					
CHAIR: C. JOHNSON					
C57.12.91	TEST CODE FOR DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS	Fosar, D. 815-678-2421	SPD EM T&D	1/9/2001 2006	Approved 1/9/2001
C57.12.4	RECOMMENDED PRACTICE FOR THE DETECTION OF PD AND THE MEASUREMENT OF APPARENT CHARGE IN DRY-TYPE TRANSFORMERS	Payne, P. 202-388-2138	NONE	6/27/1991 2007	Reaffirmed 6/13/02
C57.13.4	GUIDE FOR THE DETERMINATION OF HOTTEST SPOT TEMPERATURE IN DRY TYPE TRANSFORMERS	Payne, P. 202-388-2138		1/30/2000 9/21/1995 2005	Approved by standards board 1/30/2000
C57.16	STANDARD REQUIREMENTS, TERMINOLOGY, AND TEST CODE FOR DRY-TYPE AIR-CORE SERIES CONNECTED REACTORS	Dudley, R. 416-298-8108	NEMA IAS T&D	12/10/1996 2006 3/15/1979	Reaffirmed on 6/14/2001
C57.9.4	RECOMMENDED PRACTICE FOR INSTALLATION, APPLICATION, OPERATION & MAINTENANCE OF DRY-TYPE GEN PURPOSE DIST & POWER TR	Patterson, W. 919-848-1860		2005	Reaffirmed 6/21/2000
C57.9.6	GUIDE FOR LOADING DRY-TYPE DISTRIBUTION AND POWER TRANSFORMERS	Pierce, L. 706-291-3166	T&D SCC14 SCC10	6/26/1999 2004 6/26/1999	Reaff in progress Ballot closed 2/4/04, 100% Affirmative
IEEE 259	TEST PROCEDURE FOR EVALUATION OF SYSTEMS OF INSULATION FOR SPECIALTY TRANSFORMERS	Simpson, R. W. JR. 603-284-4362		2004	
SUBCOMMITTEE: HVDC CONVERTER TR & REACTOR					
CHAIR: R. DUDLEY					
C57.12.9	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED HVDC CONVERTER TRANSFORMERS AND SMOOTHING REACTORS	Dudley, R. 317-286-9387	EM T&D PSIM	9/16/1999 2004	Upgraded from Trial Use 3/2002 SC working on document, Need PAR
IEEE1277	GENERAL REQUIREMENTS & TEST CODE FOR OIL-IMMERSED AND DRY-TYPE HVDC SMOOTHING REACTORS	Dudley, R. 317-286-9387	SUB	3/30/2000 2005	Upgraded to full use 3/2002

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS	3/6/2004
SUBCOMMITTEE: INSTRUMENT TRANSFORMERS						
CHAIR: J. SMITH						
C57.13	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS	Nelson, T. L. 301-975-2956	PSIM PSR SPD	6/7/1995 12/10/2003 2008	New PAR Active; Expires 12/31/2007	
C57.13.2	CONFORMANCE TEST PROCEDURE FOR INSTRUMENT TRANSFORMERS	Khalim, V. 859-879-2797		12/5/1991 5/15/2003	Std withdrawn. New PAR Active; Expires 12/31/2007	
C57.13.5	TEST REQUIREMENTS FOR INSTRUMENT TRANSFORMERS OF A NOMINAL VOLTAGE OF 115KV AND ABOVE	Ma, J.	SWGR EM TC 38 US T	3/20/2003 2008	Trial Use Guide approved 3/20/2003	
C57.13.6	REQUIREMENTS FOR INSTRUMENT TRANSFORMERS FOR USE WITH ELECTRONIC REVENUE METERS AND RELAYS	Ten-Hagen C. W. 603-749-8433	PSIM PSR TD	2/13/2003	PAR Active; Expires 12/31/2007 PAR to amend C57.13 with new accuracy 0.15, 0.15 S	

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: INSULATING FLUIDS					
CHAIR: F. GRYSZKIEWICZ					
PC57.147	GUIDE FOR THE ACCEPTANCE AND MAINTENANCE OF NATURAL ESTER FLUIDS IN TRANSFORMERS	McShane, C. P. 414-524-4591		12/10/2003	PAR Approved 12/10/2003; WG Active PAR to expire on 12/31/2007
C57.104	GUIDE FOR THE DETECTION AND DETERMINATION OF GENERATED GAS IN OIL-IMMERSED TRANSFORMERS & THEIR RELATION	Heinrichs F. W. 412-941-6924	PE/IC PE/SUB PE/T&D	6/27/1991 12/10/1996 2002	WG Active, Extended until 12/31/2004 PAR Expires 12/31/2004
C57.106	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF INSULATING OIL IN EQUIPMENT	Thompson, J. 919-580-3247	NONE	6/13/2002 12/11/2002 2007	PAR Expires 12/31/2006
C57.111	GUIDE FOR ACCEPTANCE OF SILICONE INSULATING FLUID AND ITS MAINTENANCE IN TRANSFORMERS	J. Goullie 517-496-6826	IAS T&D ED&PG	2/2/1989 2008	Reaffirmed 12/10/2003
C57.121	GUIDE FOR ACCEPTANCE AND MAINTENANCE OF LESS FLAMMABLE HYDROCARBON FLUID IN TRANSFORMERS	McShane, C. P. 617-926-4900	PSRC T&D IAS	9/16/1998 2004	Need Reaffirmation
C57.130	T-U GUIDE FOR USE OF DRSS GAS ANALYSIS DURING FACTORY THERMAL TESTS FOR THE EVALUATION OF OIL-IMMERSED TRANS. AND	Heinrichs F. W. 412-941-6924	NONE	1/30/2000	New Project PAR Expires 12/31/2005
C57.139	GUIDE FOR DISSOLVED GAS ANALYSIS IN TRANSFORMER LOAD TAP CHANGERS	Ladrega, R.	IEC US TA	12/11/2002	New Project; WG Active PAR Expires 12/31/2007
IEEE 637	GUIDE FOR THE RECLAMATION OF INSULATING OIL AND CRITERIA FOR ITS USE	Thompson, J. 605-534-3571		3/11/1982 2007	Reaffirmed 12/11/2002
IEEE1258	TRIAL-USE GUIDE FOR INTERPRETATION OF GASES GENERATED IN SILICONE-IMMERSED TRANSFORMERS	Goullie/Bartley 517-496-6826	T&D ICC		Trial Guide IEEE 1258 PAR Expires 12/31/2006

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
PC57.145	GUIDE FOR DEFINITION OF THERMAL DUPLICATE TRANSFORMERS	Beuster, B.		6/25/1998	PAR Expires 12/31/2004
1538	GUIDE FOR DETERMINATION OF MAXIMUM WINDING TEMPERATURE RISE IN LIQUID FILLED TRANSFORMERS	Platts, D.		6/21/2000	Approved Standard
C57.100	TEST PROCEDURE FOR THERMAL EVALUATION OF OIL-IMMERSED DISTRIBUTION TRANSFORMERS	Wicks, R. 804-383-3500	PE/PSR IA/PSR PE/T&D	2005	Standard expires 12/31/2005
C57.119	RECOMMENDED PRACTICE FOR PERFORMING TEMP. RISE TESTS ON OIL-IMMERSED POWER TRANSFORMER AT LOADS BEYOND NP RATING	Tuli, S. 262-547-0121	SWGR SUBS SCC4 EI	6/26/1999 2004	Up for RevCom approval of Reaffirmation 3/04
C57.91	GUIDE FOR LOADING MINERAL OIL-IMMERSED TRANSFORMERS	Raymond, T. 518-884-0297	PSRC IAS EI	10/10/2001 2006	Approved New Recommended Practice 10/10/2001
IEEE1276	IEEE GUIDE FOR THE APPLICATION OF HIGH TEMPERATURE INSULATION MATERIALS IN LIQUID-IMMERSED POWER TRANSFORMERS	Franchek, M. A. 802-748-3936	T&D PSE T&D	6/14/1995 2004	Contingenda Approved 12/11/2002, Need new PAR Reaffirm disapproved, 2-year extension granted
NONE				6/26/1997 3/21/1996 2004	Balloting Reaffirmation Extended until 12/31/2004

SUBCOMMITTEE: INSULATION LIFE

CHAIR: D. PLATTS

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: PERFORMANCE CHARACTERISTICS					
CHAIR:	R. GIEGLIS				
C57.105	GUIDE FOR APPLICATION OF TRANSFORMER CONNECTIONS IN THREE-PHASE DISTRIBUTION SYSTEMS	Reiter G. 415-591-4463		6/17/1992 2004	Reaffirmed 3/99, need Reaffirmation Expires 12/31/2004
C57.109	GUIDE FOR THROUGH-FAULT CURRENT DURATION	Paul, B. 205-877-7740	PSR	3/18/1993 2005	Reaffirmed 6/21/2000 Expire 12/31/2005
C57.110	RECOMMENDED PRACTICE FOR ESTABLISHING TRANSFORMER CAPABILITY WHEN SUPPLYING NONSINUSOIDAL LOAD CURRENTS	Marek R. P. 804-838-8080	T&D PSR NEMA	7/2/1998 2004	Need Reaffirmation Reaff Date extended to 12/31/2004
C57.123	GUIDE FOR TRANSFORMER LOSS MEASUREMENT	Gieglis, R. 765-286-9532		6/13/2002 2007	Approved as new standard 6/13/02
C57.133	GUIDE FOR SHORT-CIRCUIT TESTING OF DISTRIBUTION AND POWER TRANSFORMERS	McQuinn, N. 412-829-1205	T&D, SWG PSR JECTC14	2007 9/21/1995	PAR withdrawn Mar 2003 Need new PAR
C57.142	A Guide to Describe the Occurrence and Mitigation of Switching Transients Induced by Transformer/Breaker Interaction	Degenoff, R. 518-276-6367	IAS/PSE IAS/REP	12/7/2000	DL6 being circulated to PC SC members for comment PAR Expires 12/31/2005
C57.18.10	REQUIREMENTS FOR SEMICONDUCTOR RECTIFIER TRANSFORMERS	Kennedy, S. P. 716-896-6500	NONE	3/19/1998 2008	Reaffirmed 12/10/2003
C57.21	REQUIREMENTS, TERMINOLOGY, AND TEST CODE FOR SHUNT REACTORS RATED OVER 500KVA	Dudley, R./Balma P.		4/2/1991 9/11/2003 2007	Balloting Reaffirmation - RevCom 6/23/2004 PAR Expires 12/31/2007
IEEE 638	QUALIFICATION OF CLASS 1E TR FOR NUCLEAR POWER GENERATING STATIONS	Pierce, L. W. 706-291-3166	NPE SUB SC2	3/19/1992 10/29/1990 2004	Reaffirmed 5/14/1999

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: POWER TRANSFORMERS					
CHAIR: HAGER/LUNDQUIST					
PC57.143	Guide for Application of Monitoring Equipment to Liquid-Lux, A. / Chu, D. Immersed Transformers and Components	919-856-3888		3/21/2002	WG Active PAR Expires 12/31/2007
C57.116	GUIDE FOR TRANSFORMERS DIRECTLY CONNECTED TO GENERATORS	Reiter, G. 415-508-2850		1/3/1989	Reaffirmed 6/21/2000
NONE				2005	
C57.117	GUIDE FOR REPORTING FAILURE DATA FOR POWER TRANSFORMERS AND SHUNT REACTORS	Binder, W. 702-227-2316		6/19/1986	Reaffirmed 9/16/1998
NONE				2004	Need Reaffirmation by 12/31/2004
C57.12.10	STANDARD REQUIREMENT FOR LIQUID-IMMERSED POWER TRANSFORMERS	Arteaga, J. 312-949-2704		6/13/2002	PAR Expires 12/31/2005
NONE					
C57.120	LOSS EVALUATION GUIDE FOR POWER TRANSFORMERS AND REACTORS	Jacobson, R.	SUB EM ED&PG IAS IEC	9/16/1991	Reaffirmed 1/30/2000
NONE				2005	
C57.125	GUIDE FOR FAILURE INVESTIGATION, DOCUMENTATION AND ANALYSIS FOR POWER TRANSFORMERS AND SHUNT REACTORS	Binder, W.	T&D ED&PG PSE SWGR	6/27/1991	Reaffirmed 9/16/1998, Need Reaffirmation
NONE				2004	
C57.131	REQUIREMENTS FOR LOAD TAP CHANGERS	Henning, W.		3/16/1995 5/15/2003	Reaffirmation ballot underway? Extended until 12/31/2007
PC57.131				2007	
C57.135	GUIDE FOR APPLICATION, TESTING, INSTALLATION AND OPERATION OF PHASE ANGLE SHIFTING TRANSFORMERS	Trummer /Lundquist 43-3172-606-404	PSRC EMC IAS/PSP	12/6/2001	Standard approved 12/6/01
NONE				2006	Being considered for IEEE/IEC Dual Logo
C57.140	Evaluation and Reconditioning of Liquid Immersed Power Transformers	James, B. 504-576-6246		9/16/1999	New Project; WG Active PAR extended until 12/31/2005
PC57.140					PAR Withdrawn
C57.141	GUIDE FOR APPLICATION OF LOAD TAP CHANGERS	Henning, W. 414-547-0121		6/26/1999	Need new PAR??
PC57.141					New Project; WG Active
C57.148	Standards for Control Cabinet for Power Transformers	Watson, J.		2/27/2004	PAR Expires 12/31/2007
PC57.148					

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUB DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: POWER TRANSFORMERS					
CHAIR: HAGER/LUNDQUIST					
C57.17 ANSI	REQUIREMENTS FOR ARC FURNACE TRANSFORMERS	Cosi, D. 330-875-3333		1986	STANDARD HAS BEEN WITHDRAWN TF has been established, No PAR submitted
C57.93 PC57.93	GUIDE FOR INSTALLATION OF LIQUID-IMMERSED POWER TRANSFORMERS.	Lau, M. 604-528-3201	NONE	12/12/1995 6/13/2002 2006	WG Active on revision PAR Expires 12/31/2006
SUBCOMMITTEE: STANDARDS					
CHAIR: B. CHIU					
PC57.144	Guide to Metric Conversion of Transformer Standards	Galloway, D. 573-635-7387		3/21/2002	PAR Expires 12/31/2007
C57.12.00 PC57.12.00	GENERAL REQUIREMENTS FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS	Tull, S. 414-547-0121		6/21/2000 6/14/2001 2005	Reviewed ballot comment Ballot Recirculation, PAR Exp 12/31/2005
C57.12.13 TEMP/ANSI??	CONFORMANCE REQUIREMENTS FOR LIQUID-FILLED TRANSFORMERS USED IN UNIT INSTALLATIONS INCL. UNIT SUBSTATIONS			9/2/1981	Need to assign to SC
C57.12.70 NONE	TERMINAL MARKINGS AND CONNECTIONS FOR DIST. & POWER TRANSFORMERS	Trouth, T. F. 802-751-3458	T&D SUBS FCC	1987 12/6/2000 2005	NEMA STANDARD
C57.12.80 NONE	TERMINOLOGY FOR POWER & DISTRIBUTION TRANSFORMERS	Raymond, T.	T&D SUBS	5/13/2002 2007	New WG formed Need PAR
C57.12.90 PC57.12.90	STANDARD TEST CODE FOR LIQUID-IMMERSED DISTRIBUTION, POWER, AND REGULATING TRANSFORMERS & GUIDE FOR SC TESTING OF ...	TULL S.		6/26/1999 6/14/2001 2005	Resolving negatives from latest ballot PAR Expires 12/31/2005
IEEE 32 TEMP	Standard Requirements, Terminology, and Testing Procedures for Neutral Grounding Devices			3/21/1972	Reaffirm 12/9/1997? Need to Assign to SC
IEEE 62 TEMP	IEEE Guide for Diagnostic Field Testing of Power Apparatus - Part 1: Oil Filled Power Xfmr's, Regulators, and Reactors			2004	Extend until 12/31/2004, Need to assign to SC Need Reaffirmation, In progress??

STANDARD PROJECT	TITLE	WORKING GROUP CHAIR AND PHONE	COMMITTEES REQUESTING COORDINATION	PUR DATE PAR DATE REV DUE	STATUS and COMMENTS
SUBCOMMITTEE: UG TR & NETWORK PROTECTORS					
CHAIR: C.G. NIEMANN					
C57.12.24	UNDERGROUND-TYPE 3-PHASE DISTRIBUTION TRANSFORMERS, 2500KVA AND SMALLER: HV, 345000Grdy, & BELOW LV, 480 V AND BELOW	Sullivan, J. 813-228-4111	T&D IAS/PSEC IEC TC 14 IAS/REPC	3/17/1994 1999	Administratively withdrawn on 1/15/2001
C57.12.40	REQUIREMENTS FOR SECONDARY NETWORK TRANSFORMERS, SUBWAY & VAULT TYPES (LIQUID IMMERSSED)	Klippensti, B. 204-633-7220	T&D IAS/PSEC IEC TC14 IAS/REPC NEMA	2/1/2002 2005	PAR Withdrawn Need New PAR
C57.12.44	STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS	Mulvey D. H. 415-973-4699	T&D IAS/PSEC SWGR EEI IAS/REPC NEMA	8/10/2000 2005	Revised Standard approved 8/2000
C57.12.57	REQUIREMENTS FOR VENTILATED DRY-TYPE NETWORK TRANSFORMERS 2500KVA AND BELOW, W/HV 34500V AND BELOW, LV 216V, AND	Robinson, A.	T&D EEI/T&D SCC14	3/18/1992 12/5/1991 2000	