Transformers Committee

IEEE/PES Transformers Committee

Fall 2018 Meeting Minutes

Jacksonville, FL
October 14 - 18, 2018

Unapproved

(These minutes are on the agenda to be approved at the next meeting in Spring 2019)

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ANNEXES – UNAPPROVED MINUTES OF TECHNICAL SUBCOMMITTEES

NOTE: *The Annexes included in these minutes are* ***unapproved*** *by the respective subcommittees and are accurate as of the date the Transformers Committee meeting minutes were published. Readers are encouraged to check the Transformers Committee website (www.transformerscommittee.org) for the latest revision of the unapproved and the minutes of the next Transformers Committee meeting for final revisions prior to approval.*

Annex A. Bushings SC – Peter Zhao
Annex B. Dielectric Tests SC – Ajith Varghese
Annex C. Distribution Transformers SC – Steve Shull
Annex D. Dry Type Transformers SC – Charles Johnson
Annex E. HVDC Converter Transformers & Reactors – Mike Sharp
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Annex J. Performance Characteristics SC – Craig Stiegemeier
Annex K. Power Transformers SC – Bill Griesacker
Annex L. Standards SC – Jerry Murphy
Annex M. Underground Trans & Network Protectors SC – Dan Mulkey

General Administrative Items

1.0 AGENDA

Opening Session
Monday, Oct 15: 8:00 am - 9:15 am
(Rosters circulated – attendance required to maintain Member status)

1. Welcome and Announcements ..... Sue McNelly
2. Meeting Minute ..... Tammy Behrens
3. Approval of Agenda ..... Sue McNelly
4. Approval of Minutes from Spring 2018 Meeting ..... Sue McNelly
5. Chair's Report & Administrative Subcommittee Report ..... Sue McNelly
6. Vice Chair's Report ..... Bruce Forsyth
7. Secretary's Report ..... Ed teNyenhuis
8. Treasurer's Report ..... Paul Boman
9. Standards Report ..... Jim Graham
10. Liaison Representative Reports
    - 10.1. CIGRE ..... Craig Swinderman
    - 10.2. IEC TC-14 ..... Phil Hopkinson
    - 10.3. Standards Coordinating Committee, SCC18 (NFPA Standards) ..... David Brender
    - 10.4. Standards Coordinating Committee, SCC4 (Electrical Insulation) ..... Evanne Wang
    - 10.5. ASTM ..... Tom Prevost
11. Approval of revised P&P Manual ..... Bruce Forsyth
12. Hot Topics for the Upcoming Week ..... Subcommittee Chairs
13. New Business & Wrap-up ..... Sue McNelly

Closing Session
Thursday, Oct 18: 11:00 am - 12:00 pm

1. Chair's Remarks and Announcements ..... Sue McNelly
2. Meetings Planning Subcommittee ..... Tammy Behrens
3. Reports from Technical Subcommittees (decisions made during the week)
    - 3.1. Standards ..... Jerry Murphy
    - 3.2. Subsurface Transformers & Network Protectors ..... Dan Mulkey
    - 3.3. Bushings ..... Peter Zhao
    - 3.4. Dielectric Tests ..... Ajith Varghese
    - 3.5. Distribution Transformers ..... Steve Shull
    - 3.6. Dry Type Transformers ..... Chuck Johnson
    - 3.7. HVDC Converter Transformers & Reactors ..... Mike Sharp
    - 3.8. Instrument Transformers ..... Ross McTaggart
    - 3.9. Insulating Fluids ..... David Wallach
    - 3.10. Insulation Life ..... Sheldon Kennedy
    - 3.11. Performance Characteristics ..... Craig Stiegemeier
    - 3.12. Power Transformers ..... Bill Griesacker
4. Additional Report from Standards Coordinator (issues from the week) ..... Jim Graham
5. New Business (continued from Monday) and Wrap-up ..... Sue McNelly

2.0 ATTENDANCE

2.1 COMMITTEE MEMBER ATTENDANCE

The following table lists all Committee Members registered to attend the meeting. See section 2.2 for a list of non-Committee Members registered to attend the meeting.

Legend:
CM Committee Member
CM-LM Committee Member-IEEE Life Member
CM-EM Committee Member-Emeritus

Committee Member Attendance (Red designates CM added at present meeting)

Member Type	Name	Company	Mon	Thu
CM	Anderson, Gregory	GW Anderson & Associates, Inc.	X	X
CM	Antosz, Stephen	Stephen Antosz & Associates, Inc	X	X
CM	Arteaga, Javier	ABB Inc.	X	X
CM	Ballard, Robert	DuPont	X	
CM	Beaster, Barry	H-J Enterprises, Inc.	X	X
CM	Beauchemin, Claude	TJH2b Analytical Services	X	X
CM	Bell, Myron	Delta Star Inc.	X	
CM	Betancourt, Enrique	Prolec GE	X	X
CM-LM	Binder, Wallace	WBBinder Consultant	X	X
CM	Blaydon, Daniel	Baltimore Gas & Electric	X	X
CM-LM	Boettger, William	Boettger Transformer Consulting LLC	X	X
CM	Boman, Paul	Hartford Steam Boiler	X	X
CM	Brender, David	Copper Development Assn.	X	
CM	Callsen, Thomas	Weldy-Lamont Associates	X	X
CM	Castellanos, Juan	Prolec GE	X	X
CM	Cheim, Luiz	ABB Inc.	X	
CM	Chiang, Solomon	The Gund Company	X	X
CM	Claiborne, C. Clair	Claiborne Consulting LLC	X	
CM	Colopy, Craig	EATON Corporation	X	
CM	Crotty, John	Ameren		X
CM	Davis, Eric	Burns & McDonnell	X	
CM	Del Rio, J. Arturo	Siemens	X	X
CM	Denzer, Stephanie	Alliant Energy	X	
CM	Digby, Scott	Duke Energy	X	X
CM	Dix, Larry	Quality Switch, Inc.	X	X
CM	Dohnal, Dieter	Maschinenfabrik Reinhausen	X	X
CM	Dorris, Don	Nashville Electric Service	X	
CM-LM	Fairris, James	KMS Electrical Products	X	
CM	Faulkenberry, Michael	Retired	X	
CM	Feghali, Pierre	N. American Substation Services		
CM	Ferreira, Marcos	Efacec USA, Inc.	X	
CM	Flores, Hugo	WEG Transformers USA Inc.		X
CM-LM	Foldi, Joseph	Foldi & Associates, Inc.	X	X

Member Type	Name	Company	Mon	Thu
CM	Frimpong, George	ABB Inc.	X	
CM	Garcia, Eduardo	Siemens	X	X
CM	Gardner, James	SPX Transformer Solutions, Inc.	X	X
CM	Gaytan, Carlos	Prolec GE	X	X
CM	Ghafourian, Ali	H-J Enterprises, Inc.	X	
CM	Graham, James	Weidmann Electrical Technology	X	X
CM	Griesacker, Bill	Doble Engineering Co.	X	X
CM	Haas, Michael	Instrument Transformers, LLC	X	
CM	Hachichi, Said	Hydro-Quebec	X	X
CM	Hakim, Shamaun	WEG Transformers USA Inc.	X	
CM	Hardin, Michael	H-J Enterprises, Inc.	X	
CM	Harley, John	FirstPower Group LLC	X	X
CM-LM	Hayes, Roger	General Electric	X	X
CM	Hernandez, Ronald	Doble Engineering Co.	X	
CM-LM	Herron, John	Raytech USA	X	
CM	Hochanh, Thang	Surplec Inc.	X	X
CM	Hoffman, Gary	Advanced Power Technologies	X	X
CM	Holdway, Timothy	Intermountain Electronics	X	
CM-LM	Hopkinson, Philip	HVOLT Inc.	X	X
CM	Iman, Mohammad	MGM Transformer Company	X	X
CM	John, John	Virginia Transformer Corp.	X	X
CM	Jordan, Stephen	Tennessee Valley Authority	X	X
CM	Kaineder, Kurt	Siemens AG	X	
CM-LM	Kennedy, Gael	GR Kennedy & Associates LLC	X	X
CM-LM	Kennedy, Sheldon	Niagara Transformer	X	X
CM	Khalin, Vladimir	KV Consulting	X	
CM	King, Gary	Howard Industries	X	X
CM	Kiparizoski, Zan	Howard Industries	X	
CM	Klaponski, Brian	Carte International Inc.	X	X
CM	Kraemer, Axel	Maschinenfabrik Reinhausen	X	X
CM	Kraetge, Alexander	OMICRON electronics Deutschland GmbH	X	X
CM	Kulasek, Krzysztof	ABB Inc.	X	X
CM-LM	Lackey, John	PowerNex Associates Inc.	X	X
CM	Lau, Michael	Weidmann Electrical Technology	X	
CM	Levin, Aleksandr	Weidmann Electrical Technology	X	
CM	Li, Weijun	Braintree Electric Light Dept.	X	
CM	Lopez-Fernandez, Xose	Universidade de Vigo	X	X
CM-LM	Lowdermilk, Larry	LAL International, LLC	X	
CM	Mani, Kumar	Duke Energy	X	
CM-LM	Marek, Richard	DuPont	X	X
CM	Matthews, Lee	Howard Industries	X	X
CM	McClure, Phillip	Weschler Instruments	X	
CM	McNelly, Susan	Xcel Energy	X	
CM	McTaggart, Ross	Trench Limited	X	
CM	Mehrotra, Vinay	SPX Transformer Solutions, Inc.	X	X
CM	Melle, Thomas	HIGHVOLT		

Member Type	Name	Company	Mon	Thu
CM	Mulkey, Daniel	Mulkey Engineering Inc.	X	X
CM	Murphy, Jerry	Reedy Creek Energy Services	X	X
CM	Murray, David	Tennessee Valley Authority	X	X
CM	Musgrove, Ryan	Oklahoma Gas & Electric	X	X
CM	Naderian, Ali	Metsco		
CM	Nambi, Shankar	Bechtel	X	X
CM	Narawane, Aniruddha	Power Distribution Inc	X	X
CM	Parkinson, Dwight	EATON Corporation	X	X
CM	Patel, Poorvi	Electric Power Research Institute (EPRI)	X	X
CM	Patel, Sanjay	Royal Smit Transformers		
CM	Payerle, George	Carte International Inc.	X	X
CM	Penny, Brian	American Transmission Co.	X	
CM	Perjanik, Nicholas	Weidmann Electrical Technology	X	
CM-LM	Platts, Donald	Saucon Resources Inc	X	X
CM	Pointner, Klaus	Trench Austria GmbH	X	X
CM	Poulin, Bertrand	ABB Inc.	X	
CM	Prevost, Thomas	Weidmann Electrical Technology	X	X
CM	Radbrandt, Ulf	ABB AB	X	X
CM	Rasco, Jimmy	Rasco Consulting LLC	X	
CM	Rasor, Robert	SDMyers, LLC.	X	
CM	Rathi, Rakesh	Virginia Transformer Corp.	X	X
CM	Ray, Jeffrey	JLR Consulting, Inc.	X	X
CM	Reed, Scott	MVA Diagnostics, Inc.	X	X
CM	Riffon, Pierre	Pierre Riffon Consultant Inc.	X	X
CM	Robalino, Diego	Megger		X
CM	Roussell, Marnie	Entergy	X	X
CM	Sarkar, Amitabh	Virginia Transformer Corp.	X	X
CM	Sauer, Daniel	EATON Corporation	X	X
CM	Schappell, Steven	SPX Transformer Solutions, Inc.	X	
CM	Schroeder, Stephen	ABB Inc.	X	
CM	Schweiger, Ewald	Siemens AG	X	X
CM	Selvaraj, Pugazhenthi	Virginia Transformer Corp.	X	
CM	Sewell, Adam	Quality Switch, Inc.		
CM	Sewell, Jeremy	Quality Switch, Inc.	X	X
CM	Sharp, Michael	Trench Limited	X	X
CM	Sharpless, Samuel	Rimkus Consulting Group	X	
CM	Shertukde, Hemchandra	University of Hartford	X	
CM	Shull, Stephen	North Fork SE, LLC	X	X
CM	Sizemore, Thomas	ABB Inc.	X	X
CM	Skinger, Kenneth	Scituate Consulting, Inc.	X	
CM	Smith, Edward	The H-J Family of Companies	X	X
CM	Snyder, Steven	ABB Inc.	X	X
CM	Solano, William	The H-J Family of Companies	X	X
CM	Som, Sanjib	Pennsylvania Transformer	X	X
CM	Spitzer, Thomas	City Transformer Service Co.	X	
CM	Spurlock, Mike	American Electric Power	X	X

Member Type	Name	Company	Mon	Thu
CM	Stiegemeier, Craig	ABB Inc.	X	X
CM	Sweetser, Charles	OMICRON electronics Corp USA	X	
CM	Swinderman, Craig	Mitsubishi Electric Power Products	X	X
CM	Tanaka, Troy	Burns & McDonnell	X	X
CM-LM	Tendulkar, Vijay	PDI		X
CM	teNyenhuis, Ed	ABB Inc.	X	X
CM	Termini, Giuseppe	PECO Energy Company	X	
CM	Thibault, Michael	Pacific Gas & Electric	X	X
CM	Thompson, James	T&R Service Company	X	X
CM	Thompson, Robert	RST Consulting, P.C.	X	
CM	Thompson, Ryan	Burns & McDonnell	X	X
CM	Tostrud, Mark	Dynamic Ratings, Inc.	X	X
CM	Traut, Alan	Howard Industries	X	X
CM	Varghese, Ajith	SPX Transformer Solutions, Inc.	X	X
CM	Vedante, Kiran	Mitsubishi Electric Power Products	X	
CM	Vijayan, Krishnamurthy	PTI Manitoba Inc.	X	X
CM	Vir, Dharam	SPX Transformer Solutions, Inc.	X	
CM	Walker, David	MGM Transformer Company	X	X
CM	Wallace, David	Mississippi State University	X	X
CM	Wallach, David	Duke Energy	X	X
CM	Watson, Joe	JD Watson and Associates Inc.	X	X
CM	Weatherbee, Eric	PCORE Electric		
CM	Weisensee, Matthew	PacifiCorp	X	X
CM	Wicks, Roger	DuPont	X	
CM-LM	Wilks, Alan	Consultant	X	
CM	Woods, Deanna	Alliant Energy		
CM	Zhao, Peter	Hydro One	X	X
		Total Members present:	140	93
		% of Members Present of 224 members:	63%	42%

Based upon the above attendance totals:

Quorum was achieved at Monday Opening Session.

Quorum not achieved at Thursday Closing Session.

2.2 GENERAL ATTENDANCE

The following table lists all non-Committee Members registered to attend the meeting. See section 2.1 for a list of Committee Members registered to attend the meeting.

Legend:

AP	Active Participant
AP-LM	Active Participant-IEEE Life Member
II	Interested Individual
II-LM	Interested Individual-IEEE Life Member
PCM	Past Committee Member

Member Type	Name	Company	Mon	Thu
AP	Abdelkamel, Hamid	Ameren	X	
II	Aikens, Thomas	Virginia Transformer Corp.		
AP	Allen, Jerry	Metglas, Inc.		
II	Alonso, Mario	Transformer Quality Consulting	X	
II	Andersen, Glenn	Fayetteville PWC	X	X
AP	Antweiler, James	Schneider Electric	X	
AP	Armstrong, James	Trench Limited		
II	Arnold, Elise	Starkstrom-Geraetebau GmbH		X
II	Attard, Jason	Consolidated Edison Co. of NY	X	
AP	Ayers, Roy	Nashville Electric Service	X	
II	Bachand, Martin	Cloverdale Paint Inc.		
II	Banovic, Mladen	Transformers Magazine		
AP	Baranowski, Derek	Baron USA, LLC		
II	Bargone, Gilles	FISO Technologies Inc.	X	
II	Barnes, Jeff	Norplex-Micarta	X	
II	Barrientos, Israel	Prolec GE	X	X
AP	Bartek, Allan	C-K Composites	X	
AP	Basel, Cheryl	WEG Transformers USA Inc.		
II	Baugus, John	Sharp Control Services, LLC	X	
AP	Baumgartner, Christopher	We Energies	X	X
II	Bedoya, Duvier	ABB Inc.		
AP	Behrens, Tammy	SPX Transformer Solutions, Inc.		
AP	Benach, Jeff	Weidmann		
II	Benedict, Ramon	Jordan Transformer	X	X
II	Bennett, Jay	Southern Company Services	X	
II	Berler, Daniel	ZTZ Services International		
AP	Bernesjo, Mats	ABB Inc.	X	
AP	Berube, Jean-Noel	Rugged Monitoring Inc.	X	X
II	Biggie, Kevin	Weidmann Electrical Technology	X	
AP	Bigham, Lee	Instrument Transformer Equip Corp		
AP	Blackmon, Jr., James	Georgia Power Co.	X	
AP	Blackwell, Zack	TCI Sales, Inc.		
AP	Blake, Dennis	Pennsylvania Transformer		
AP	Blaszczyk, Piotr	The Specialty Switch Co LLC	X	
II	Blew, David	PSE&G		X
AP	Boege, Alan	Orto de Mexico		

Member Type	Name	Company	Mon	Thu
AP	Bolar, Sanket	Megger	X	X
II	Bolliger, Ph.D., Dominique	HV TECHNOLOGIES, Inc.	X	
II	Bonn, Mike	Soltex Inc.	X	
II	Borowitz, James	Eversource Energy	X	X
II	Bradford, Eric	General Electric		
AP	Brafa, John	JSHP Transformer	X	X
AP	Brannen, Randy	Southern Company Transmission		
II	Bray, Elizabeth	Southern Company Services	X	
AP	Britton, Jeffrey	Phenix Technologies, Inc.	X	
AP	Brown, Darren	Howard Industries	X	X
II	Brzoznowski, Steven	Bonneville Power Administration	X	
AP	Cai, Jim	JSHP Transformer	X	
II	Calitz, David	Siemens Industry	X	X
II	Cameron, Stephen	Siemens AG	X	
AP	Campbell, James	Atlantic Power Sales, LLC		X
AP	Cantrell, Rick	Sunbelt Transformer		
II	Carvalho, Jose	Efacec Energia, SA		
II	Casserly, Edward	Ergon, Inc.	X	
AP	Castillo, Alonso	M&I Materials, Inc.		
AP	Caverly, David	Trench Limited	X	
AP	Chambers, Stuart	Powertech Labs Inc.	X	
AP	Chapa, Raymundo	WEG Transformers USA Inc.		
AP	Cheatham, Jonathan	General Electric		
II	Cheema, Muhammad Ali Masood	Northern Transformer		X
AP	Chisholm, John	IFD Corporation		
AP	Chrysler, Rhett	ERMCO	X	X
II	Chumbiauca, Francisco	Schweitzer Engineering Labs	X	X
II	Chwialkowski, Artur	ABB Lodz Poland	X	
II	Ciganik III, George	HICO America	X	
AP	Collin, Jean-Francois	Nomos Systems	X	
AP	Corsi, Domenico	Doble Engineering Co.	X	
II	Corvigno, Jennifer	Consolidated Edison Co. of NY		
AP	Costa, Florian	Corimpex USA, Inc.		
AP	Cox, Paul	GE Grid Solutions	X	
II	Craig, Douglas	Richards Manufacturing Co.		
AP	Craven, Michael	Phoenix Engineering Services	X	X
II	Craver, Bart	KMS Electrical Products		
II	Cross, James	Kinectrics	X	
AP	Cruz, Jorge	PTI Transformers		
II	Cui, Yuanzhong	TBEA Shenyang	X	X
II	Culver, Charles	M&I Materials, Inc.	X	
II	Cumella, Arthur	NWL Transformers		
AP	Cunningham, Kelcie	AMR PEMCO		
AP	Dahlke, Michael	Central Moloney, Inc.	X	X
AP	Daniels, Timothy	Weidmann Electrical Technology		
II	Dargiel, Piotr	ABB Lodz Poland	X	

Member Type	Name	Company	Mon	Thu
AP	Dauzat, Thomas	General Electric	X	X
II	De Oliveira, Everton	Siemens Ltda	X	X
II	del Valle, Yamille	NEETRAC	X	X
II	Delisle, Jacques	Nomos Systems	X	
II	Demes, Rolando	Arteche		
AP	Dennis, Scott	ABB Inc.	X	
AP	DeRouen, Craig	ERMCO	X	X
AP	Diaby, Mohamed	ABB Inc.		X
II	Diaz, Rodolfo	Commonwealth Associates, Inc.	X	
II	Dillon, Nikolaus	Dominion Energy	X	X
II	Dinh, Huan	ABB Inc.		
II	Dolloff, Paul	East Kentucky Power		X
II	Drobnick, Jason	Jordan Transformer	X	X
AP	Dulac, Hakim	Qualitrol Company LLC	X	
II	Dutta Roy, Samragni	Siemens Industry Inc.		
II	Ebbert, Alexander	ZTZ Services International		
II	Edwards, Pam	Central Moloney, Inc.	X	
II	El Masri, Mohamad	Southern California Edison	X	
II	Elliott, Joshua	Nashville Electric Service	X	
AP	Elliott, William	General Electric	X	
II	Enders, Matthew	Oncor Electric Delivery	X	
II	Engerer, Daniel	FirstEnergy Corp.	X	X
II	Faherty, Joseph	OTC Services Inc.		X
AP	Faulkner, Mark	EATON Corporation	X	
II	Faur, Florin	ABB Inc.	X	
AP	Fausch, Reto	RF Solutions	X	X
AP	Fedor, Ken	Smit Transformer Sales, Inc.		
II	Fennell, Howard	Nashville Electric Service	X	X
AP	Fenton, Roger	Fenton Solutions		X
II	Ferguson, Glenn	Efacec USA, Inc.		
II	Foata, Marc	Maschinenfabrik Reinhausen	X	
II	Fong, Sanford	Georgia Power Co.	X	
II	Fontenot, Darryl	Tice & Associates		
II	Ford, Seaira	Baron USA, LLC		
AP-LM	Forrest, George	Uptime Solutions Co, LLC	X	
AP	Foschia, John	SPX Transformer Solutions, Inc.	X	
II	Friend, Fredric	American Electric Power	X	X
AP	Frotscher, Rainer	Maschinenfabrik Reinhausen		
II	Fuith, Justin	Pro-Tech Power	X	
II	Furlanetto, Carlo	Siemens Industry		
II	Fyrer, Bob	DuPont	X	
AP	Gagnon, Jean-Francois	Siemens Transformers Canada		
AP	Gara, Lorne	Orbis Engineering	X	
AP	Garcia, Benjamin	Southern California Edison		
II	Garneau, Jean	Essex Wire	X	
II	Garrity, Jonathan	Tagup		

Member Type	Name	Company	Mon	Thu
AP	Gaun, Alexander	Coil Innovation	X	
II	Gazda, James	ABB Inc.		
AP	Geibel, David	ABB Inc.	X	X
II	Gonzalez Ceballos, Jose Antonio	Meramec Instrument Transformer Co.		
AP	Gonzalez de la Vega, Jorge	Orto de Mexico	X	
II	Goulkhah, Monty	Trench Canada	X	
AP	Gragert, Jeffrey	Xcel Energy	X	X
AP	Gross, Detlev	Power Diagnostix	X	
II	Guertin, Chris	Cloverdale Paint Inc.		
II	Gustavsson, Niklas	ABB AB	X	
AP	Gyore, Attila	M&I Materials Ltd	X	X
AP	Hamilton, Kendrick	Power Partners	X	
AP	Hammer, Mark	Jordan Transformer		
II	Hampton, Kenneth	Baltimore Gas & Electric	X	X
AP	Harder, Steven	Siemens Industry		
II	Harper, Robert	Soltex Inc.	X	
II	Harris, Richard	Aurtra Ltd		
AP	Harrison, Ken	N. American Substation Services	X	
AP	Hartmann, Thomas	Pepco Holdings Inc.	X	X
II	Heiden, Kyle	EATON Corporation		
II	Henry, Jeffery	Mapes & Sprowl		
AP	Holden, Andrew	Ergon, Inc.		
II	Holleran, Joseph	Ameren	X	
AP	Holmes, Jill	Bureau of Reclamation	X	
AP	Holsomback, Steve	Southern Company Services		
II	Hummel, Carl	HICO America		
II	Huynh, Sikhiu	Pacificorp	X	
AP	Jackson, Jerry	3M		
AP	Jakob, Fredi	Consultant		
II	Jakob, Karl	Delta Star Inc.		
AP	Jaroszewski, Marion	Delta Star Inc.	X	
II	Jhala, Anirudhdhsinh	Transformers & Rectifiers (India) Ltd	X	
AP	Johannson, Larry	T&D Products Ltd.		
AP	Johnstone, Ted	Cogent Power Inc.	X	
II	Jones, Grace	Delta Star Inc.		
AP	Joshi, Akash	Black & Veatch	X	X
AP	Joshi, Arvin	General Electric		
II	Kanty, Stephen	Isberg & Associates, Inc		
II	Karas, Jon	SDMyers, LLC.	X	
II	Keegan, Darren	C-K Composites	X	
AP	Kelley, Robert	N. American Substation Services		
II	Kelly, Joe	TCI Sales, Inc.		
II	Khan, Suleman	Ontario Power Generation	X	
AP	Kirchenmayer, Egon	Siemens AG	X	X
II	Kircher, Christophe	JST Transformateurs	X	
AP	Kirchner, Lawrence	Siemens Industry	X	

Member Type	Name	Company	Mon	Thu
II	Kittrell, Brad	Consolidated Edison Co. of NY	X	
II	Klein, Ken	Grand Power Systems	X	X
II	Kleine, Peter	US Army Corps of Engineers	X	X
II	Konrad, Ronny	Huntsman Advanced Materials	X	
II	Konta, Ivan	KONCAR - Instrument Transformers	X	X
II	Kopp, Alvin	High Voltage Test Engineering Inc.	X	
AP	Kornowski, Marek	Polycast International	X	
II	Korte, Steve	Cargill, Inc.		
AP	Koshel, Anton	Delta Star Inc.	X	X
AP	Kostich, Nicholas	Ameren	X	
AP	Kranich, Neil	Jordan Transformer	X	X
II	Kumaria, Deepak	ABB Inc.		
AP	Kuppuswamy, Raja	Dynamic Ratings, Inc.	X	
AP	Lachman, Mark	Doble Engineering Co.	X	
AP	Larochelle, David	NDB Technologies	X	
II	Lawrence, Matthew	N. American Substation Services	X	
AP	Leal, Fernando	Prolec GE	X	
AP	Leal, Gustavo	Dominion Energy	X	
II	Lecomte, Antoine	JST Transformateurs	X	
II	Lee, Moonhee	Hammond Power Solutions	X	
AP	Lee, So-young	Hyundai Electric	X	
II	Leece, Benjamin	American Electric Power	X	
AP	Levi, Raka	AMforum	X	X
II	Lim, DongGi	ILJIN Electric USA, Inc.	X	
II	Lima, A. Pedro	Efacec Energia, SA	X	X
II	Lin, Antony	Fortune Electric		
II	Lin, Jacky	Fortune Electric		
AP	Lively, Parry	Tempel	X	
AP	Livingston, Kerry	Great River Energy	X	
II	Lizardo, Alex	Cargill, Inc.	X	
AP	Locarno, Mario	Doble Engineering Co.	X	X
AP	Lopes, Ana	Efacec Energia, SA		
II	Lopes, Ricardo	Efacec Energia, SA	X	X
II	Lovins, Colby	Federal Pacific Transformer	X	
II	Lowther, Jr., Mark	Mitsubishi Electric Power Products		
II	Lu, William	Shanghai Huaming Power Equipment		
AP	Lugge, Andrew	Mitsubishi Electric Power Products		
II	Lukenda, Nikola	Petro-Canada Lubricants Inc.	X	
II	MacArthur, Tara-lee	Ergon Energy	X	
AP	Macdonald, Nigel	Trench Limited	X	
AP	Macias, Alejandro	CenterPoint Energy	X	X
AP	Mai, Tim-Felix	Siemens AG	X	
AP	Malde, Jinesh	M&I Materials, Inc.	X	X
AP	Mango, Joseph	NextEra Energy Resources		
II	Mangubat, Darrell	Siemens Power Operations Inc.	X	X
II	Mansuy, Bruno	Trench France SAS	X	

Member Type	Name	Company	Mon	Thu
AP	Marquardt, Bryan	AK Steel	X	
II	Martig, Arnaud	Trench Limited		X
AP	Martin, Terence	Doble Engineering Co.	X	
AP	Martin, Zach	Delta Star Inc.		
II	Martinez, Joaquin	Siemens	X	X
II	Martinez, Rogelio	Georgia Transformer	X	
II-LM	Marx, Sr., Robert	Marx Associates, Inc.		
II	Maucione, Luke	Rea Magnet Wire		
II	Mayer, Robert	Siemens AG	X	
II	Mayer, William	Delta-X Research Inc.		
II	McBride, Brian	Cargill, Inc.	X	
AP	McBride, James	JMX Services, Inc.	X	X
II	McConn, Corey	Pennsylvania Transformer		
AP	McCullough, Douglas	Maxima / Hyundai	X	
II	McFadden, John	HICO America		
II	McGlew, Barry	Cargill Industrial Specialties (CIS)		
AP	Mciver, James	Siemens Industry		
AP	McKinney, Kenneth	UL LLC	X	
AP	Middleton, Robert	RHM International	X	
AP	Miller, Michael	Siemens Industry	X	
II	Miller, Philip	Memphis Light, Gas & Water	X	
AP	Minhaz, Rashed	Transformer Consulting Services Inc.	X	X
II	Minikel, Justin	EATON Corporation	X	
II	Mohamad, Meri	Siemens Industry	X	
AP	Montanha, Juliano	Siemens Ltda	X	X
AP	Montpool, Rhea	Schneider Electric	X	
II	Morakinyo, Paul	PSE&G		X
AP	Morales-Cruz, Emilio	Qualitrol	X	
AP	Morgan, Charles	Eversource Energy	X	X
II	Morgan, Michael	Duke Energy	X	
II	Morris, Tim	Walton EMC	X	
II	Morrow, Gianetta	Meramec Instrument Transformer Co.	X	X
II	Munn, William	Southern Company Services		
II	Munoz Molina, Martin	Orto de Mexico	X	
II	Murata, Masaharu	Hitachi, Ltd. Power Business Unit		
AP	Mushill, Paul	Ameren	X	
II	Natale, Anthony	HICO America	X	
II	Neder, Frank	Trench Germany GmbH	X	
II	Nguyen, David	Entergy Services, Inc.		
II	Nguyen, Nam Tran	ABB Inc.	X	X
AP	Nunez, Arturo	Mistras Group, Inc.		
AP	Oakes, Stephen	Instrument Transformer Equip Corp	X	
II	Ocon, Rodrigo	Industrias IEM	X	X
AP	Ogajanov, Rudolf	ABB Inc.	X	
II	Ohanian, Vahe	UNION Partners LLC		
AP	Oliver, William	Virginia/Georgia Transformer	X	

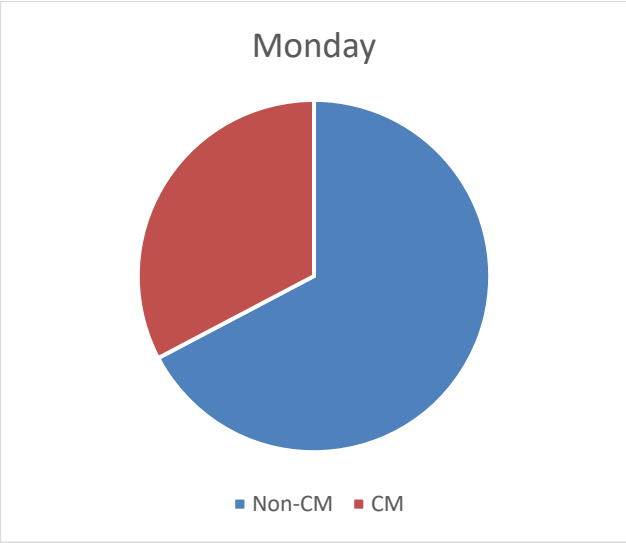
Member Type	Name	Company	Mon	Thu
AP	O'Malley, Anastasia	Consolidated Edison Co. of NY		
AP	Ortiz, Jow	NextEra Energy		
II	Osorio, Luis	The H-J Family of Companies		
II	Osuna, Miguel	ABB Inc.	X	X
II	Owen, John	Powertech Labs Inc.	X	
II	Owens, Roger	Central Moloney, Inc.	X	
II-LM	Padgett, Alan	N. American Substation Services		
II	Padmanaban Iyer, Ashwin	Transformer Protector Corp.	X	
II	Pargaonkar, Vijay	Virginia Transformer Corp.	X	
II	Parnell, Jason	Howard Industries		
II	Partington, Jamie	Cogent Power Inc.	X	
II	Partyka, George	Partner Technologies Inc.	X	
AP	Patel, Dhiru	Hammond Power Solutions	X	X
II	Patil, Ankita	Olsun Electrics Corporation	X	
AP	Patoine, Barbara	Weidmann Electrical Technology	X	X
AP	Pellon, Verena	Florida Power & Light	X	
AP	Pepe, Harry	Phenix Technologies, Inc.	X	
II	Pereira, Paulo	Efacec Energia, SA		
II	Peterson, Caroline	Xcel Energy		
II	Picher, Patrick	Hydro-Quebec IREQ	X	
II	Pietraszczyk, Marcin	ABB Sp. z o.o.	X	X
II	Plante, Sylvain	Hydro-Quebec	X	X
II	Plath, Cornelius	OMICRON electronics GmbH	X	X
AP	Prince, Jarrod	ERMCO	X	
AP	Pruente, John	SPX Transformer Solutions, Inc.	X	
II	Prykhodko, Volodymyr	ZTZ Services International	X	
AP	Quandel, Jennifer	HPN Global		
II	Quarterman, Brian	JEA	X	
II	Radu, Ion	ABB Inc.	X	
II	Rahman, Ziaur	Gainesville Regional Utilities (GRU)	X	
II	Ramirez Bettoni, Eduardo	Xcel Energy		X
II	Ramirez, Juan	CELECO	X	X
AP	Rashid, Adnan	Measurement Canada/Industry Canada	X	X
II	Ratcliffe, Robert	Georgia Transformer		
II	Rato, Nuno	Efacec Energia, SA		
II	Ratty, James	Electronic Technology Inc.		
II	Raymond, Mark	UL LLC		
II	Reagan, John	Duke Energy	X	
AP	Reiss IV, Clemens	Custom Materials, Inc.		X
II	Rezai, Hossein	Transformer Consultant, Inc.	X	
II	Rincon, Diego	Electroporcelana Gamma		
II	Rinks, Timothy	Delta Star Inc.		
AP	Riopel, Sebastien	Electro Composites ULC		
II	Riordan, Kevin	WEG Transformers USA Inc.	X	
AP	Roberts, Mark	N. American Substation Services		
II	Roberts, Paul	Baron USA, LLC		

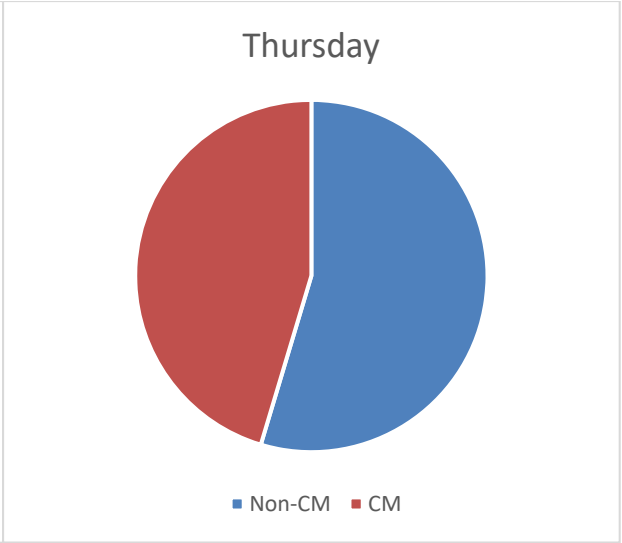
Member Type	Name	Company	Mon	Thu
AP	Robey, Dennis	RL Components	X	
AP	Rock, Patrick	American Transmission Co.	X	X
II	Rodriguez, Leopoldo	--	X	
AP	Roizman, Oleg	IntellPower Pty Ltd		X
AP	Roman, Zoltan	General Electric	X	X
AP	Ronchi, Rodrigo	WEG-Voltran	X	X
AP	Rottenbacher, Andre	Ritz Instrument Transformers	X	
II	Russwurm, Dirk	DTM Instruments, LLC		
AP	Saad, Mickel	ABB Inc.	X	X
AP	Sahin, Hakan	ABB Inc.	X	
AP	Salgado, Pedro	Electronic Technology Inc.		
II	Salva, Jose	JST Transformateurs	X	
AP	Sanchez, Eduardo	Pacific Gas & Electric	X	
II	Sanchez, Oliverio	Pacific Gas & Electric	X	
AP	Sandhu, Surinder	Sanergy Consulting	X	X
AP	Sbravati, Alan	Cargill, Inc.	X	X
AP	Scarborough, Mark	DuPont	X	X
AP	Scardazzi, Alaor	Siemens Ltda	X	X
AP	Schiessl, Markus	Starkstrom-Geraetebau GmbH	X	X
AP	Schleismann, Eric	Southern Company Services	X	X
AP	Schrammel, Alfons	Siemens AG	X	X
II	Schwartz, Dan	Quality Switch, Inc.	X	X
II	Schwarz, Carl	Phoenix Electric Corporation	X	
II	Scoby, Denny	PG Access	X	
AP	Sen, Cihangir	Duke Energy	X	
II	Sestito, John	Hyundai Electric		
AP	Sewell, Russell	Quality Switch, Inc.	X	
II	Sexton, Aron	Kinectrics		
II	Shalabi, Jaber	VanTran Industries, Inc.	X	
AP	Shannon, Michael	Rea Magnet Wire		
II	Sharifi, Masoud	Siemens Gamesa Renewable Energy		
AP	Sheehan, David	HICO America	X	
II	Shelton, Eric	Tice & Associates		
AP	Shem-Tov, Mark	VRT Power	X	X
AP	Sheridan, Peter	SGB USA, Inc.	X	
II	Sherwood, Nathan	Unitil	X	
II	Shin, Jin Woo	Hyundai Electric		
II	Shin, Yongju	ILJIN Electric USA, Inc.	X	
AP	Shirasaka, Yukiyasu	Hitachi, Ltd.	X	
II	Shrewsbury, Justin	AMR PEMCO	X	
AP	Siebert, Stefan	BROCKHAUS MESSTECHNIK		
II	Siebert-Timmer, Audrey	IFD Corporation	X	X
AP	Simon, Preston	Electrical Technologies		
AP	Simonelli, Richard	SPX Transformer Solutions, Inc.	X	
II	Simonov, Igor	Toronto Hydro	X	X
AP	Simons, Andre	Cogent Power Inc.	X	

Member Type	Name	Company	Mon	Thu
AP	Singh, Kushal	ComEd		
AP	Slattery, Christopher	FirstEnergy Corp.		X
AP	Smith, K. Shane	Delta Star Inc.		X
II	Song, Y. C.	JSHP Transformer		
II	Sonnenberg, Brian	Instrument Transformers, LLC	X	
AP	Sparling, Brian	Dynamic Ratings, Inc.	X	
AP	Speegle, Arthur	Entergy Services, Inc.		
AP	Stacy, Fabian	ABB Inc.	X	X
II	Staley, Brad	Salt River Project	X	X
AP	Stank, Markus	Maschinenfabrik Reinhausen	X	
AP	Stankes, David	3M	X	
II	Steeves, Gregory	Baron USA, LLC	X	
AP	Steineman, Andrew	Delta Star Inc.	X	X
AP	Stem, Gregory	Cardinal Pumps & Exchangers	X	X
AP	Stockton, David	The H-J Family of Companies		
II	Stuber, Tina	ABB Inc.	X	
II	Su, Paul	FM Global		X
II	Subramany, Shankar	KEMA Laboratories, DNV GL	X	
AP	Sullivan, Kevin	Duke Energy	X	
AP	Sullivan, Liz	Dominion Energy	X	
II	Sullivan, Philip	Power Partners	X	
II	Sun, Yunhan	China Elect. Equip. Industry Assoc.	X	
II	Suresh, Babanna	Southwest Electric Co.	X	
II	Swartz, Ryan	JEA	X	
II	Szczechowski, Janusz	ABB Inc.		
II	Szewczyk, Radoslaw	DuPont Poland Sp. z o.o.	X	
II	Taylor, Marc	Cogent Power Inc.	X	
II	Tedesco, Joseph	ABB Inc.	X	X
II	Tekin, D. Serhat	Meramec Instrument Transformer Co.	X	
II	Thompson, Clifton	N. American Substation Services	X	
AP	Tillery, Timothy	Howard Industries	X	X
II	Tinsley, Robert	Cloverdale Paint Inc.		
II	Titus, Eric	Megger		
II	Trantham, Thomas	N. American Protection & Control, LLC		
II	Turner, Justin	GE Energy Connections		
II	Tyler, Lee	Warco, Inc.	X	
II	Vaagensmith, Bjorn	Idaho National Laboratory	X	
AP	Valentin, Reinaldo	Duke Energy	X	
AP	Valmus, Jeff	Cargill, Inc.	X	
AP	Van Horn, Jeremy	IFD Corporation	X	X
II	van Rijnsoever, Frank	SMIT Transformatoren B.V.		
AP	Varnell, Jason	SPX Transformer Solutions, Inc.	X	
AP	Veens, Jos	SMIT Transformatoren B.V.	X	X
II	Vermeulen, Henricus	SMIT Transformatoren B.V.		
II	Viera, Yadira	M&I Materials, Inc.		
II	Villagran, Deniss	GE Grid Solutions	X	X

Member Type	Name	Company	Mon	Thu
AP	Viswasam, Anselm	Hyperion		
AP	vonGemmingen, Richard	Dominion Energy	X	X
II	Wahid, Waqar	Mitsubishi Electric Power Products		
II	Waldrop, Hugh	Memphis Light, Gas & Water	X	
II	Walters, Mark	Mitsubishi Electric Power Products		
AP	Walters, Shelby	Howard Industries	X	
AP	Wang, Evanne	DuPont	X	
AP	Weathington, Larry	N. American Substation Services		
II	Webb, Bruce	Knoxville Utilities Board	X	X
II	Webb, Matthew	SPX Transformer Solutions, Inc.	X	
II	Webber, Kenyon	Entergy	X	X
II	Wei, Peter	Los Angeles Dept. of Water & Power	X	
II	Weiss, Zachery	WEG Transformers USA Inc.	X	
II	Welton, Drew	Beckwith Electric Co.	X	
AP	Werelius, Peter	Megger	X	X
II	Weyer, Daniel	Nebraska Public Power District	X	
II	Whipple, Bradley	Idaho National Laboratory	X	
AP	Whitehead, William	Camlin Power	X	
AP	Williams, Randy	N. American Substation Services		
II	Willingham, Lee	Central Moloney, Inc.	X	
II	Wilson, Armond	Mitsubishi Electric Power Products		
AP	Wimberly, Barrett	GE Grid Solutions	X	X
AP	Winter, Dr. Alexander	HIGHVOLT Pruftechnik Dresden	X	X
AP	Wright, Jeffrey	Duquesne Light Co.	X	X
II	Yang, Fei	ABB Inc.	X	X
II	Yazdani, Mana	Trench Limited	X	
II	Yeboah, Kwasi	GE Energy Management		
II	Youn, Sung-yeol	ILJIN Electric Co., Ltd.	X	
II	Young, Robert	Mitsubishi Electric Power Products		
AP	Zaman, Malia	IEEE	X	X
II	Zhang, Ji	Mitsubishi Electric Power Products		
PCM	Zhang, Shibao	PCORE Electric		
II	Zhu, Hanxin	BC Hydro		
AP	Zibert, Kris	Allgeier, Martin and Associates	X	X
AP	Ziger, Igor	KONCAR - Instrument Transformers	X	X
II	Zito, Anthony	Siemens Energy		
II	Zuiderveen, Thomas	IFD Corporation		
		Total Non-Committee Member Attendance: Total Committee Member Attendance: Total Attendance:	288 140 428	112 93 205

In addition to the above totals, there were **185** of the total attendees that attended **both** the Monday and Thursday Sessions and **448** that attended **either** the Monday or the Thursday Session.


Monday
Non-CM
CM


Thursday
Non-CM
CM

Monday Opening Session

3.0 Approval of Agenda and Previous Minutes – Sue McNelly

The Chair presented the Agenda. A motion to approve the agenda was made by Dan Sauer (2nd by Jerry Murphy). The Chair asked if there was any opposition to unanimous approval of the Agenda. Hearing none, the Agenda was approved.

A motion was made to approve the minutes of the Spring 2018 meeting by Phil Hopkinson (2nd by Dan Sauer). The Chair asked if there was any opposition to unanimous approval of the minutes of the Spring 2018 meeting that had been posted on the website. Hearing none, the minutes of the Spring 2018 meeting were approved as written.

4.0 Chair's Remarks & Report – Sue McNelly

Chair's Remarks – Presented at the Monday General Session -- Jacksonville, Florida - Fall 2018

4.1 IEEE PES Technical Council

The Technical Council of the IEEE Power Energy Society (PES) is composed of the Chairpersons of the PES Technical and Coordinating Committees, plus the Chairpersons of Standing Committees reporting to it. The full organizational structure of the PES is shown in the current version of the IEEE PES Organization Chart and Committee Directory (http://www.ieee-pes.org/pes-organization-chart-and-committee-directory). The PES Technical Committees report to the Technical Council on matters concerning membership, recognition, technical publications, scope and the coordination of the Power Energy Society generated standards. For standards relating to their technical scope, the Technical Committees work directly with the IEEE-SA Standards Board and the PES Standards Coordinating Committee. For further details on the Statement of Purpose and Scope of Activities for the PES Technical Council Please see; http://www.ieee-pes.org/statement-of-purpose-and-scope-of-activities-for-the-pes-technical-council.

4.1.1 Technical Council Officers & Members

The officers and members of the Technical Council are listed below for your reference. Each individual listed here is the chair of that respective committee.

TECHNICAL COUNCIL OFFICERS 2018-2019

Chair	Farnoosh Rahmatian (Quanta Technology)
Vice Chair	Vijay Vittal (Arizona State University)
Secretary	Hong Chen
Past Chair	Miriam Sanders (SEL University)

STANDING COMMITTEES 2018-2019	**Chair**
Technical Activities Awards	Miriam Sanders
Technical Sessions	Vijay Vittal
Organization & Procedures, O&P	Hong Chen
Standards Coordinating	Ted Burse
Website	Dan Toland

COORDINATING COMMITTEES 2018	**Chair**
Intelligent Grid & Emerging Tech., IGETCC	Doug Houseman
Marine Systems, MSCC	Dwight Alexander
Wind and Solar Power, WSPCC	Debbie Lew

TECHNICAL COMMITTEES 2018	Chair
Analytical Methods for Power Systems, AMPS	Alex Schneider
Electric Machinery, EM	Kay Chen
Energy Development & Power Generation, EDPG	Ward Jewell
Energy Storage & Stationary Battery, ESSB	Chris Searles
Insulated Conductors, IC	E. Rusty Bascom
Nuclear Power Engineering, NPE	Thomas Koshy
Power System Communications & Cybersecurity, PSCC	Mike Dood
Power System Dynamic Performance, PSDP	Claudio Canizares
Power System Instrumentation & Measurements, PSIM	Ernst Hanique
Power System Operation Planning & Economics, PSOPE	Luiz Barroso
Power System Relaying & Control, PSR	Pratap Mysore
Smart Buildings Loads & Customer Systems, SLCS	Shawn Chandler
Substations, SUB	Diane Watkins
Surge Protective Devices, SPD	Ronald Hotchkiss
Switchgear, SWGR	T Irwin
Transformers. TRANS	Susan McNelly
Transmission and Distribution, T&D	Gary Chang

4.1.2 PES Technical Council Activities

Joint Technical Committee, JTCM Webex Meeting, July 11, 2018.

Angie Rajski Parashis – Technical Council and Committees – New PES Staff Support and Liaison to IEEE PES was introduced. She indicated that she plans to work with Technical Council leadership and to facilitate relationships with the Technical Committees.

The next Technical Council retreat that will be attended by the Transformer Committee Chair will be held 11/29 – 11/30/2018 in Scottsdale, Arizona.

The next JTCM meeting will be held in January 13 – 17, 2019 in Garden Grove, California.

IEEE PES will be developing a Topics Calendar to encourage the curation of new content from the Technical Committees. The calendar will allow for the solicitation of new presenters and authors across all product areas of PES. It will include, but not be limited to, reports, guides, standards, webinars, tutorials, articles, workshops, etc. This effort will require the collaboration of many groups within IEEE PES.

The Technical Council is also looking to create an inventory of completed content on the Technical Committee websites. They are also looking to make the look and feel of the Technical Committee websites more consistent. How this will affect the Transformers Committee website will be discussed in section 4.2.9 of this report.

4.2 TRANSFORMERS COMMITTEE ACTIVITIES

Steve Shull will be stepping down as Distribution Transformer SC Chair. He will be replaced by J Ed Smith.

4.2.1 Liaison Representatives - Appointed by Committee Chair.

- ASTM D27 – Tom Prevost
- CIGRE – Craig Swinderman
- IEC TC-14 - Phil Hopkinson
- Standards Coordinating Committee, SCC No. 18 (NFPA/NEC) – David Brender
- Standards Coordinating Committee, SCC No. 4 (Electrical Insulation) - Evanne Wang

4.2.2 Committee Schedule

Jerry Murphy has volunteered to manage the Committee Meeting Schedule. Please send meeting time slot updates and requests to Jerry going forward.

4.2.3 RFID

RFID tags on the name badges will be used for the Jacksonville meeting in a similar manner as past meetings. Kris Zibert will be managing the RFID programming during the meeting. Please make sure that contact information that will be sent out with the preliminary schedule before each meeting is kept current.

4.2.4 Thursday morning Tutorials and Webinar opportunities

Tom Prevost is coordination topics for the Thursday morning tutorials. If interested, see Tom or any of the officers. Any feedback by attendees is welcome.

IEEE PES continues to request that each of the Technical Committees offer Webinar opportunities regarding our standards work.

4.2.5 Association Management System, 123 Signup

All WG's should be using AMS to track their membership and meeting attendance. If you are unable to so, please assign it to someone in your group. In addition to using the AMS, a list of names and affiliations must be included in the meeting minutes.

IEEE is still working towards the use of the AMS, 123 Signup system, but a firm date for this transition has not been identified. The revisions due to the Europeon GDPR may be part of the holdup. When it is finally put into effect, the yearly cost to the Transformers Committee will be covered by IEEE. The Committee will still be responsible for any registration system and credit card fees.

4.2.6 Website Password Usage

It is not for public dissemination. It is for use by our meeting attendees (CM, AP, II) and associated work of the Transformers Committee. Access to the protected information on the Committee website is a benefit of attendance and participation. It may be used by meeting attendees and within attendees' immediate workplace, but not beyond that. A new password will be implemented immediately after the Jacksonville meeting.

4.2.7 Call for Patents (Essential Patent Claims)

https://standards.ieee.org/about/sasb/patcom/patc.html

A call for patents is required at every Working Group (WG) meeting. This is a reminder to all WG leaders to call for patents and record the results in the meeting minutes. Note it is not required to show the patent slides; it is only necessary to call for patents and record the response in the minutes. If there is a claim reported, the WG chair shall include in the minutes the name & affiliation of the individual asserting a patent claim. Here is what each WG Chair should ask at the beginning of each WG meeting. This applies only to WG's after the PAR is approved by the IEEE-SA Standards Board.

If anyone in this meeting is aware of any patent claims that are potentially essential to implementation of the document under consideration by this WG, that fact should be made known to the WG and recorded in the meeting minutes.

There should be no discussion of any patent claim identified, only that it be identified and recorded. Even if no patent claims are identified, the minutes are to indicate that the call for patents was made.

If a patent holder or patent applicant is identified, then the WG Chair (or designee) should ask the patent holder or patent applicant of a patent claim that might be or become an Essential Patent Claim to complete and submit a Letter of Assurance in accordance with Clause 6 of the IEEE-SA Standards Board Bylaws.

A Letter of Assurance (LoA) is a document submitted to IEEE-SA by a patent holder which documents the submitter's position with regard to ownership, enforcement, or licensing of an Essential Patent Claim that may be incorporated into a specific IEEE document. As of October 2018, the following six (6) existing Accepted Letters of Assurance pertain to our committee:

1. C57.127 Guide for Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors. LoA recorded September 6, 2005. Filed by ABB Technology, Ltd. Patent Serial Number: 6,340,890 (US)
2. C57.139 Guide for Dissolved Gas Analysis in Transformer Load Tap Changers. LoA recorded January 16, 2013. Filed by Maschinenfabrik Reinhausen GMBH. Patent Serial Number: Not indicated
3. C57.163 Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances. LoA recorded May 5, 2014. Filed by Advanced Power Technologies, LLC. Patent Serial Number: 20130285671 (US)
4. C57.147 Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers, and C57.155 Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers. LoA recorded April 5, 2017. Filed by Cooper Power Systems, LLC. Patent Serial Number: 6,398,986 (US), 6,905,638 (US), 7,651,641 (US)
5. C57.147 Guide for Acceptance and Maintenance of Natural Ester Fluids in Transformers, and C57.155 Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers. LoA recorded April 5, 2017. Filed by Cooper Power Systems, LLC. Patent Serial Number: PI 9612097-5
6. C57.143 IEEE Guide for Application for Monitoring Equpment to Liquid Immersed Transformers and Components. LoA submitted to IEEE October 12, 2018. Filed by Roger Fenton. Patent Docket number 15/371,085.

4.2.8 Transformers Committee Policies and Procedures (P&P) Update

A revised TC Sponsor P&P will be voted on at the Jacksonville meeting. Although the WG P&P is not due for revision, work on this and either a separate Entity WG P&P or addition of this to the WG P&P will be starting up once the TC Sponsor P&P is complete.

The P&P is one of three main governing documents that comes from PES Tech Council and IEEE-SA. It is sometimes called the Sponsor P&P, and it applies to Standards Development.

There is also an O&P, for Organization & Procedures, which supplements the P&P and applies to everything else the Committee does. It covers: general operating procedures of the committee, subcommittees, and working groups; responsibilities of officers; membership issues; org chart; technical papers and presentations, etc. Review of the O&P document will be done to make sure that it aligns with any changes made to the P&P.

The third governing document is the Working Group P&P.

4.2.9 Website

Susan McNelly, the present Webmaster has started working on a transition from the present non web based web updating program to a web based platform. A base platform has been created and plans are to begin populating the new platform between now and the next meeting. A definitive timeline has not been set. A web based updating platform will allow multiple people the ability to make updates to spread the workload.

Individuals interested in helping with this effort should contact Susan.

Respectfully submitted,

Susan J. McNelly
Chair, IEEE/PES Transformers Committee

October 14, 2018

5.0 VICE CHAIR'S REPORT – BRUCE FORSYTH

The Vice-Chair's Report was presented at the Monday General Session.

5.1 IEEE PES CALENDAR OF UPCOMING EVENTS

The following are upcoming PES sponsored conferences and committee meetings. Please check the PES website at www.ieee-pes.org for further details, and additional events.

- 2018 IEEE PES Technical Council Strategic Planning Retreat
  November 29-30, 2018, Scottsdale, AZ
- 2019 IEEE PES Joint Technical Committee Meeting
  January 13-17, 2019, Garden Grove, CA
- 2019 IEEE PES General Meeting
  August 4-8, 2019, Atlanta, GA

5.2 IEEE PES GENERAL MEETING – AUGUST 4-8, 2019

5.2.1 General

The theme for the 2019 IEEE PES General Meeting is "Expect Uncertainty, Prepare to Adapt."

The meeting will have 4 Super Sessions as follows:
1. Resiliency
2. Impact of High Penetration of Renewable Resources
3. Storage
4. Risk-Based Transmission Planning and Operation

5.2.2 Conference Paper Submittals

The 2019 General Meeting paper submission site is open. The deadline for paper submissions is November 6, 2018. Submissions will be peer reviewed and accept or reject decision made February 14, 2019.

5.2.3 Poster Session Opportunity

PES Working Groups and Technical Committees are invited to share their activities through poster presentations. The following information is recommended to be included on each poster:
- Technical Committee name
- Working Group name
- Project Title
- PAR number (if relevant)
- Project scope
- Target completion date
- Project status

- Key technical points being addressed in the work

Respectfully,

Bruce Forsyth
Vice-Chair
October 12, 2018

6.0 SECRETARY'S REPORT – ED TENYENHUIS

The Secretary's Report was presented at the Monday General Session.

6.1 MEMBERSHIP REVIEW

The Committee welcomes and encourages active participants to become Members of the Committee. Requirements and application forms can be found in the Organization and Procedures (O&P) Manual, accessible on the Committee website. A link to the Membership Application form can be found on the TransformersCommittee.org homepage in the Committee Information Box. Subcommittee Chairs are encouraged to recommend new members and to communicate the process of attaining membership through **active participation** and **contribution** at the WG and SC level. New member applications may be submitted to the Committee Secretary's attention at any time. Applications will be collected for review and approval in batches at each Administrative Subcommittee meeting.

6.1.1 New Committee Member Approvals

At the Spring 2018 Administrative Subcommittee meeting, eight new committee member applications were reviewed. All eight of the applications were approved. The new members are listed in the following table.

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Myron Bell	Delta Star	**Bill Griesacker Power Transformer SC** 3 yr.	Tom Prevost WG PC57.162 1.5 yr.	Gary Hoffman C57.12.10 Revision 2+ yr.	Producer
Jermaine Clonts	Power Partners	**Dan Mulkey Submersible Transformer SC** 2 yr	Alan Traut WG PC57.12.23 3 yr.	Patrick McShane WG PC57.147 2 yr.	Producer
James Dorsten	Alabama Power Company	**Dan Mulkey Submersible Transformer SC** 2 yr	Brian Klaponski WG C57.12.40 2 yr.	Mark Faulkner WG C57.12.44 2 yr.	User
Hugo Flores	CG Power Systems	**E. teNyenhuis Perf. Char. SC** 5 yr.	Enrique Betancourt WG PC57.158 2.5 yr.	Phil Hopkinson WG P60076-16 3 yr.	Producer
Rakesh Rathi	Virginia Transformer	**Ajith Varghese Dielectric Test SC** 2 yr.	Ramsis Girigs TF Audible Sound 2 yr.	Joe Watson WG C57.148 2 yr.	Producer

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Pugazhenthi Selvaraj	Virginia Transformer	**Ajith Varghese Dielectric Test SC** 2 yr.	W. Binder WG PC57.125 3 yr.	Rogerio Verdolin WG PC57.120 2 yr.	Producer
Alwyn VanderWalt	Public Service Company of New Mexico	**Bill Griesacker Power Transformer SC** 4 yr.	Mike Lau WG PC57.93 4 yr.	Claude Beauchemin WG PC57.104 4 yr.	User
David Walker	MGM Transformer	**Chuck Johnson Dry Transformer SC** 3 yr	Casey Ballard WG PC57.12.01 3 yr.	Sheldon Kennedy WG C57.18.10 2 yr.	Producer

6.1.2 New Member Applications

Ten new applications for Committee Membership have been received for consideration since the last meeting. The following table lists the names of the applicants and a summary of their supporting eligibility information.

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Alan Sbravati IEEE – Yes PES – Yes SA – Yes	Cargill	**Sheldon Kennedy Insulation Life SC** 2 yr.	Patrick McShane WG PC57.147 2 yr.	Mike Lau WG PC57.93 2.5 yr.	Producer
Darren Brown IEEE – Yes PES – Yes SA – Yes	Howard Industries	**Dan Mulkey Submersible Transformer SC** 5 yr	Alan Traut WG PC57.12.20 8 yr.	Steve Shull WG PC57.19.02 3 yr.	Producer
Dave Stankes IEEE – Yes PES – Yes SA – Yes	3M	**Chuck Johnson Dry Transformer SC** 3 yr	Robert Ballard WG C57.12.01 2 yr.	Roger Wicks P-1276 5 yr.	General Interest
Israel Barrientos IEEE – Yes PES – Yes SA – Yes	Prolec GE	**Dan Mulkey Submersible Transformer SC** 2 yr	Enrique Betancourt WG PC57.158 2.5 yr.	Phil Hopkinson WG P60076-16 3 yr.	Producer
Jason Varnell IEEE – Yes PES – Yes SA – Yes	SPX Transformer Solutions	**Ajith Varghese Dielectric Test SC** 2 yr.	Steve Shull WG PC57.12.70 3 yr.	Vinay Mehrotra WG C57.109 3 yr.	Producer
Kris Zibert IEEE – Yes PES – Yes SA – Yes	Allgeier, Martin and Associates	**Tammy Behrens Meetings SC** 2 yr.	Sanjib Som WG PC57.12 2 yr.	Joe Watson WG C57.148 2 yr.	User
Leal Gustavo IEEE – Yes PES – Yes SA – Yes	Dominion Energy	**Peter Zhao Bushing SC** 5 yr.	Craig Colopy WG PC57.15 5 yr.	Mike Spurlock WG PC57.143 1.5 yr.	User

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Thomas Dauzat IEEE – Yes PES – Yes SA – Yes	GE	**Steve Shull Distribution Transformer SC** 2 yr	Craig Colopy WG PC57.131/60214-1&2 3 yr.	Craig Colopy WG PC57.15/60076-21 3.5 yr.	Producer
Tim-Felix Mai IEEE – Yes PES – Yes SA – Yes	Siemens	**Chuck Johnson Dry Transformer SC** 3 yr	Roger Wicks WG PC57.158 3 yr.	David Walker WG C57.12.91 3 yr.	Producer
Shankar Subramany IEEE – Yes PES – Yes SA – Yes	Kema	**Ajith Varghese Dielectric Test SC** 2 yr.	Vinay Mehrotra WG C57.109 2 yr.	Sanjay Patel WG C57.164 2 yr.	General Interest

These applications will be reviewed at the Fall 2018 Administrative Subcommittee meeting.

6.1.3 Association Management System (AMS) Database

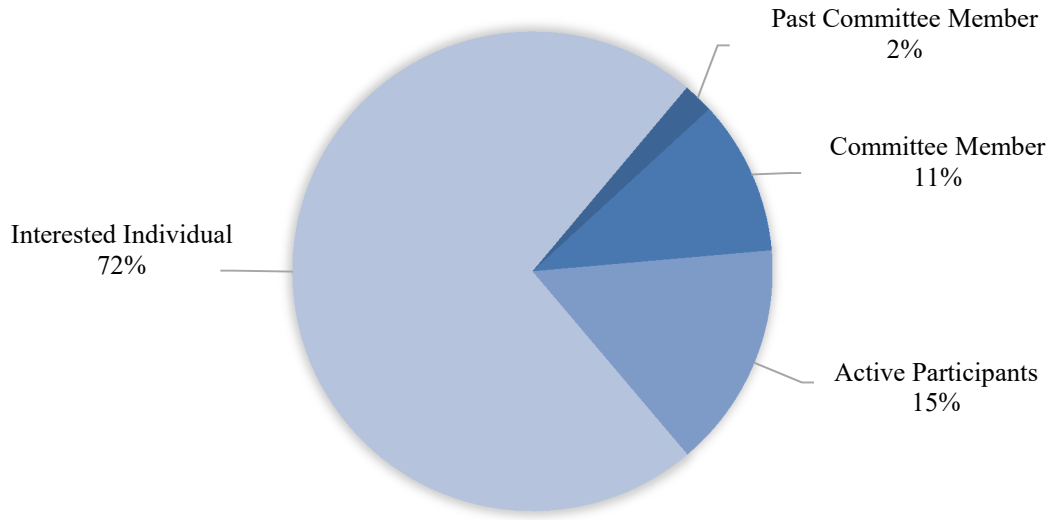
The Transformers Committee AMS database of people currently has three general categories of participation in our activities. These are: **Interested Individual**, **Active Participant**, and **Committee Member**. In addition, the Committee Secretary maintains a list of **Past Committee Members**. Anyone can join the AMS 123 system as the system is designed for self-registration. A new participant will automatically be assigned the role of Interested Individual when they first sign up. It is the responsibility of each individual to keep his/her profile updated (except for the participant status). Based on the level of participation, the committee administrative staff will upgrade the participation status to "Active Participant" when appropriate. The Committee Member status however, can only be attained through a formal application with the sponsorship of a minimum of three WG or SC chairmanships, at least one of which must be a SC Chair. Details of the application requirements and approval process by the Administrative Subcommittee are outlined in our O&P manual.

The following table contains a count of the participants grouped by the four general categories (CM totals do not include those requesting membership at this meeting or Members to be moved to Past Member Status).

Membership Status	F14	S15	F15	S16	F16	S17	F17	S18	F18*
Interested Individual	1386	1362	1462	1471	1507	1554	1550	1552	1551
Interested Individual - IEEE Life Member	10	9	11	11	11	11	11	13	12
Total Interested Individuals	**1396**	**1371**	**1473**	**1482**	**1520**	**1565**	**1561**	**1565**	**1563**
Active Participant	201	205	240	242	258	275	302	321	324
Active Participant - IEEE Life Member	6	6	7	5	5	5	5	5	5
Total Active Participants	**207**	**211**	**247**	**247**	**263**	**280**	**307**	**326**	**329**
Committee Member	170	173	161	172	175	180	169	175	181
Committee Member – Emeritus	10	10	10	9	9	9	9	10	10
Committee Member - IEEE Life Member	20	22	23	25	27	29	28	33	33
Total Committee Members	**200**	**205**	**194**	**206**	**211**	**218**	**206**	**216**	**224**
Past Committee Member	18	19	28	32	31	30	42	38	38
Past Committee Member - IEEE Life Member	6	7	6	5	5	5	7	6	6
Total Past Committee Members	**24**	**26**	**34**	**37**	**36**	**35**	**49**	**44**	**44**
TOTAL IN AMS DATABASE	**1827**	**1813**	**1948**	**1972**	**2028**	**2098**	**2123**	**2151**	**2160**

*S18 data is as of Sept 9, 2018

MEMBERSHIP SUMMARY



6.2 COMMITTEE, SUBCOMMITTEES, AND WORKING GROUP ROSTERS

In order to provide indemnification to working group and subcommittee members it is crucial that membership lists be maintained. The AM system has these functions built-in to ease these administration tasks. It is important that each subcommittee and working group chair keep the rosters updated so that this information can be provided to the IEEE SA.

A similar main committee roster has also been developed to track attendance for the Main Committee General Session meeting on Monday & Thursday. The data will be used to update participant's membership profile.

6.3 IEEE/PES AND IEEE/SA MEMBERSHIP REQUIREMENTS

As a reminder, all members of the Transformers Committee must also be members in good standing of the Power & Energy Society (IEEE/PES) and the Standards Association (IEEE/SA).

WG Chairs must be members in good standing of the sponsoring subcommittee SC as well as the Power & Energy Society (IEEE/PES) and the Standards Association (IEEE/SA).

6.4 COMMITTEE MEMBERSHIP MAINTENANCE

An attendance audit was performed in mid-September 2018. As a result of the audit, the following 10 members who missed 4 or more Committee meetings in a row will be changed from Committee Member to Past Committee Member:

1. John Crouse
2. Dieter Dohnal
3. Pierre Feghali
4. John Graham
5. Timothy Holdway
6. Joe Melanson
7. Arthur Molden
8. Kirk Robbins
9. James Shekelton
10. Jennifer Yu

Note that Past Committee Members can be reinstated to Committee Members if their status changes and they are able to regularly participate within two years of being changed to Past Committee Member.

6.5 ESSENTIAL PATENT CLAIMS

All registrants were asked to agree with the following statement:

> *"I have read the Patent Claim notice on the following webpage, and I understand that if I am aware of any Essential Patent Claim related to issues being discussed or considered for inclusion in standards being developed by one or more Working Groups of the Transformers Committee, it is my responsibility to inform the Chair of the Working Group affected by such claim."*

Working Group Chairs are asked to make a Call for Essential Patent at the beginning of each meeting and to record the results in the meeting minutes.

6.6 AFFILIATION

According to the IEEE Standards Board Bylaws, there is a requirement that participants of an IEEE meeting disclose their employer and affiliation. Consultants must state if they are sponsored or not. It is not sufficient to simply announce "My name is John Smith, and I'm a consultant." If a consultant is sponsored by a client, it must be disclosed. If the consultant does not have a sponsor, the proper introduction is something such as "My name is John Smith, I am a consultant, and I represent myself at this meeting."

6.7 MEETING MINUTES

The minutes of the Spring 2018 meeting have been posted to the committee website. Thank you to everyone for submitting their minutes in a prompt fashion.

Subcommittee Chairs are asked to submit their respective subcommittee meeting minutes for the Jacksonville meeting to the Committee Secretary no later **Nov 29, 2018**, which is **6 weeks** after the completion of the meeting. It is strongly recommended that meeting minutes be prepared at or just after the meeting while the activities are still fresh in members' minds. Doing so will help to ensure the activities and decisions made during the meeting are accurately reflected in the minutes.

Subcommittee meeting minutes should be submitted via e-mail to the Committee Secretary, Ed teNyenhuis [edt@ieee.org], who will forward them on to the webmaster for posting on the Committee website. The submittal file should be saved as a Word document formatted similar to this document. Attendance, indication of quorum, names of members making any motion, seconding any motion, and the result of any votes (affirmative and negative count) for each SC, WG, and TF meeting shall be included in all minutes.

Respectfully submitted,

Ed teNyenhuis
Secretary
IEEE/PES Transformers Committee
Sept 24, 2018

7.0 TREASURER'S REPORT – PAUL BOMAN

The Treasurer's Report was presented at the Monday General Session.

October 13, 2018

To: Susan McNelly, Chair
IEEE PES Transformers Committee

RE: IEEE PES Transformers Committee Treasurer's Report
Fall 2018 Meeting (for reporting period 02/01/2018 to 09/10/2018)

Dear Susan,

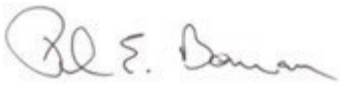
The finances of the Committee are in good condition. As of September 10th (end of this reporting period), the balance in our Concentration Bank account was $95,665.80.

FYI: The September 10th balance was essentially a "snap-shot in time" after all income & expenses were resolved from the previous Spring 2018 Meeting in Pittsburgh, and before we started spending significant funds for the Fall 2018 Meeting in Jacksonville.

During the reporting period two RFID scanners were purchased to improve the system reliability. There are two venue deposits scheduled for payment prior to the Spring 2019 meeting totaling $60,000 that must be accrued into our accounting process.

See attached summary of the balance of this reporting period, and the previous periods. Let me know if you have any questions or concerns.

Sincerely,



Paul E. Boman, Treasurer IEEE PES, Transformers Committee

IEEE PES TRANSFORMERS COMMITTEE
Treasurer's Report - Fall 2018
(for reporting period 02/01/2018 to 09/10/2018)

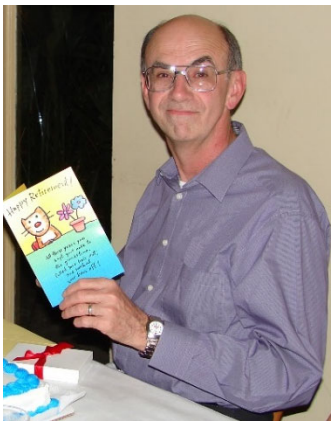
AAAAA	**Balance before Fall 2016 Meeting, as of 08/31/2016**	**$60,111,54**
AAAA	**Balance before Spring 2017 Meeting, as of 01/31/2017**	**$83,245.91**
AAA	**Balance before Fall 2017 Meeting, as of 08/31/2017**	**$87,065.75**
AA	**Balance before Spring 2018 Meeting, as of 01/31/2018**	**$94,320.62**
	Misc Income, not related to a specific meeting	
	-- interest, approx. 6 months	$882.48
	-- misc. income; shirt sales, CD-ROM sales, book sales, etc.	$0.00
B	Total Misc. Income, not meeting related	$882.48
	Misc Expenses, not related to a specific meeting	
	-- 123Signup subscription fee, for approx. 6 months	$2051.00
	-- awards	$1,207.18
	-- equipment purchases; projectors & cases, etc.	$99.00
	-- technology; RFID tech, meeting app, WiFi equip, printers & ink, cables, etc.	$2,140.00
	-- conferences, PES GM, remote meetings, etc.	$5,872.55
	-- other misc. expenses; shirts, CD-ROMs, books, office supplies, namebadges, etc.	$1,550.00
	--memorials & donations	$430.00
C	Total Misc. Expenses, not meeting related	$13,349.73
	Fall 2017 Meeting	
	-- late income, meeting registrations (rolling reserve paybacks)	$13,585.23
	-- misc. late income (incentives, late sponsor contributions, etc.)	$0.00
	-- late meeting expenses	($111.10)
D	Total Late Income/(expenses), Fall 2017 Meeting	$13,474.13
	-- reported prelim. gain/(loss), as of 01/31/2018, from previous Treasurer's Report	($2,531.69)
	Actual Gain/(Loss), Fall 2017 Meeting	$10,942.44
	Spring 2018 Meeting	
	-- income, meeting registrations	$ 229,865.74
	-- income, coffee break sponsors	$ 0.00
	-- meeting expenses	($ 209,390.56)
E	Income minus expenses (between 02/01/2018 and 09/01/2018)	$ 20,475.18
	-- meeting income (expenses), before 01/31/2018	$ 5,758.02
	Preliminary Gain/(Loss), Spring 2018 Meeting	$ 26,233.20
	Expenses, Future Meetings (deposits paid, etc)	
FF	-- future meeting income (expenses), paid 09/01/2017 to 01/31/2018	$0.00
FFF	-- future meeting income (expenses), paid 02/01/2018 to 09/10/2018	($20,136.88)
G	**Net Income (loss), between Fall 2017 and Spring 2018 meetings (B - C + D + E)**	**$21,482.06**
A	**Balance before Fall 2018 Meeting , as of 09/10/2018 [(AA - FF) + G]**	**$115,802.68**

8.0 RECOGNITION AND AWARDS REPORT – STEPHEN ANTOSZ

The Recognition and Awards Report was presented at the Monday General Session.

8.1 IN MEMORIAM

8.1.1 Steve Smith



Stephen Douglas Smith, 69, passed away on May 16, 2018 after a courageous battle with cancer. Stephen graduated in 1972 from Ohio State University where he received his Master's degree in Electrical Engineering. He worked at Kuhlman Electric until his retirement in 2007. He became a member of the Transformers Committee in 1991. After leaving Kuhlman, Steve and his wife of 49 yrs, Linda returned to their farm in Newark, Ohio. Steve is survived by his wife, three children, and two grandchildren.

Tributes:

Ted Everman of AEP - So sorry to hear of Steve's passing. Had dinner many times together in Mississippi. Always great to chat with him.

Tony LaRe - I am very saddened to learn of my old transformer buddy passing away. We worked together at AEP in the Canton days building the 765KV system.

Jeoffry M Bednar - Sorry to hear of Steve's passing we shared many times over the years learning from each other about transformers.

Steve Snyder - I first worked with Steve when he came to McGraw-Edison in 1979. He quickly became a close friend and mentor. It was Steve that encouraged me to join IEEE, and in those days we often traveled together to Columbus for local Section meetings. As time passed, eventually Steve hired me at Kuhlman in Kentucky, and he encouraged me to join the Transformers Committee which I began attending in 1995. No one has shaped my career more than Steve Smith.

Roger Dugan - Steve and I worked together at McGraw-Edison and Cooper Power where we did some pioneering work on "Low-side Surges" in distribution transformers from 1985 to 1992. Recently saw a pole-top transformer in Waterford with a Storm Trapper HE hanging on it. That is a result of our work. I also worked with Steve after he moved to Kuhlmann on various substation transformer failures. Some the most interesting work I have done in my career. Steve was my transformer mentor and was always willing to answer my questions. I will miss him.

8.1.2 Tom Golner

Tom passed away unexpectedly on June 9, 2018 at the age of 67 years. Beloved husband of Patricia for 43 years. Tom graduated from Marquette University with a BS in Chemistry and Masters in Electrical Engineering. He was employed at SPX in Waukesha. He was an active participant in the IEEE Transformers Committee meetings for many years. Tom was a member of the Milwaukee Porsche Club and the Microlite Flyers. He enjoyed bird watching, bowling, horse racing, auto racing, watching old movies and playing golf and softball.

Tributes:

Allan Bartek - I am deeply saddened to hear of Tom's passing. We have been friends for well over 20 years seeing one another every 6 months or so at the Transformers Committee meetings. Tom was a brilliant Engineer. We had transformers in common but also, we shared a love of Autocrossing. So many times we would take some time, find a restaurant and trade Autocross stories all night. I was always impressed with Tom's kindness and genuine interest in helping others. My deepest condolences to his wife Pat and family we will all miss him

Tom Schmidt - He was a good man and friend always willing to help. Will miss him dearly. He was an excellent mentor taught me a lot when we worked together at SPX. Will never forget the look when asked a question. It would be a second as he pondered and then respond with a very detailed, accurate answer. He will be in our thoughts and prayers.

Tom Beske - I was shocked and saddened to hear of Tom's passing. I worked with Tom for many years. He was well respected for his friendly smile and his vast knowledge of transformers and all that went into them. I often went to him for help when trying to solve a problem. He was always willing to help and usually provided valuable information. I am retired but I know SPX will miss him greatly.

Gary Stuyvenberg - Deeply saddened to hear about Tom. Knew him during my days as Secretary of Porsche Club. Great autocross competitor, fish fry, summer picnic, tech session, Carrera Chili, Turbo Spaghetti and Christmas party regular. It was always exhilarating watching him perform. He loved competing. He was my favorite autocrosser. Was always stirring up Porsche conversation with him. He got more out of that '67 green 911 than most did in cars 10, 20, 30 years newer. Was always an encouragement to me. Great memories! He will be missed.

8.1.3 Dennis J. Allan

Passed away in early July 2018. Internationally renowned Professor Dennis J. Allan, member of the Institute of Electrical and Electronics Engineers (IEEE), member of the Institution of Electrical Engineers (IEE), member of the Institution of Mechanical Engineers (IMECHE), former Chairman of IEC TC14 (transformers) and IEC SC 36A (bushings), Director and Technical Manager of GEC ALSTOM T&D Transformers Limited, Stafford (1987-1997), and technological advisor to GEC ALSTOM since 2005. Dennis held a patent for "Methods of making power distribution transformers", October 12, 1994, was Chair of the CIGRE Power Transformer and Reactor Study Committee SC A2 from 1986-1994 and co-authored Chapter 1 in the "Electric Power Transformer Engineering" book. Dennis was an IEEE Life Fellow and received his Fellowship in 1992 for contributions to the design and development of power transformers. He was a Transformers Committee Member from ~1976 until 2005 and continued to participate until 2013. Dennis was particularly active in the Dielectric Test Tables WG, PD Measurement Guide WG, and the Moisture in Oil TF. Dennis leaves behind his wife Glenis.

Tributes:

John Graham: Dennis was a great mentor to me personally through my standards work with IEC and IEEE and our time in the HVET organization. I'm sure he will be greatly missed.

Bill Chiu: We all knew Dennis as one of the industry's technical pillars of our time.

Peter Balma: He will be missed. I was fortunate to have spent time with him at several CIGRE meetings around Europe and occasionally at our meetings.

Sheldon Kennedy: I knew Dennis from our interaction with IEC and IEEE standards. He was always a great technical expert and gentleman. We did work together on a project for Alstom Drives where Niagara Transformer was building the transformers for their drives group. They were particularly nasty in that they were cyclo-converter drives that generate DC currents in the secondary wave forms at certain drive frequencies. The project was for the NASA wind tunnels in Hampton Virginia where they test air craft and the space shuttle at the time. Now they also test race cars in there. There were several sections of secondary windings with their own loads that cascaded together. Each secondary section had to have its own air gaps in the core legs to block the effects of the DC currents. So the core legs consisted of multiple air gaps with fringing effects. This was one of the rare cases where two transformer manufacturers worked together to compare their design expertise and FEA analysis in order to make sure the solution was correct for the Alstom drives. Stafford really wasn't interested in building these according to Dennis. But, he and I worked together to make sure nothing was missed, including when he flew to Newark to meet me in an airport hotel conference room to compare everything. He never left the airport and flew back to England after our meetings. The project went splendidly without problems.

He was really one of the finest engineers you would ever want to meet.

8.1.4 Heinz G. Fischer

Heinz Fischer passed away on April 9, 2018. He was 89-years-old. He was still in excellent health but died in a tragic accident while working on his home in St. Johns, US Virgin Island. He was a long-time Member of the IEEE Transformer Committee. Heinz was born March 10, 1929 in the Balkans. He and his family moved to Germany in his youth. After completing his education, he started his engineering career at Brown Boveri Transformer Division located in the city of Basel, Switzerland. He was still living in Germany, just across the Rhine River, and commuted each day on his bicycle.

In 1964 Westinghouse Electric opened its Large Power Transformer factory in Muncie, Indiana. Heinz was recruited by Westinghouse and joined the company as a Senior Development Engineer overseeing the management the company's Licensees from around the world. While in Muncie Heinz and his family earned their United States citizenships.

In the later 1960s Heinz was hired by Allis-Chalmers in West Allis, Wisconsin as their VP of Engineering and Sales. In 1969 EHV-Weidmann Industries was a new start up producing high voltage insulation for the transformer industry. EHV-Weidmann needed both technical and sales expertise and approached Heinz about joining them in St. Johnsbury, Vermont. He was hired as the VP of Engineering and Sales and elected to the Board of Directors August 1, 1972.

His role at Weidmann Electrical increased to include: Quality Assurance, R&D and Technical Services. He developed the company's technology offerings including the establishment of high voltage, chemical and mechanical laboratories. He was one of the primary drivers that helped Weidmann become a leader in transformer insulation materials and systems.

Heinz retired from Weidmann in March of 1994 to pursue with his wife Linda (Lyndi) their love for outdoor adventure. They were both private pilots in airplanes and hot air balloons. Heinz became a certified instructor in the latter. In their retirement they visited every continent, including several weeks in Antarctica. They spent winters in Vermont skiing and summers in St. Johns, Virgin Island scuba diving.

In April 2008 they became the oldest married couple (79 and 72) to cross country ski to the North Pole and are now in the Guinness Book of World Records. Heinz took a video of his GPS reading 0° 0' 0". They spent the night at the North Pole and in the morning found that the ice cap had drifted 1.4 km. Two years later they joined a Discovery Channel expedition in search of the most northerly dry tract of land. After two weeks searching they discovered "Ultima Thule" a 126-foot-long tract of permanent land with a maximum elevation of about 40 feet. They planted USA and Switzerland flags on the peak.

Heinz was a manager, engineer, teacher, mentor and most of all a good friend to many young and old engineers in the transformer industry. He will be dearly missed by many.

Mike Franchek: "He was my boss, mentor and friend. Pam and I are quite saddened by this."

8.2 GENERAL SERVICE AWARDS

Outgoing Subcommittee Chair – Steve Shull, Distribution Transformers SC

8.3 NEW MEMBERS OF THE TRANSFORMERS COMMITTEE

The Transformers Committee welcomes 10 new committee members. Each of the following people were presented with a membership certificate:

- Alan Sbravati Cargill
- Darren Brown Howard Industries
- Dave Stanks 3M
- Israel Barrientos Prolec GE
- Jason Varnell SPX Transformer Solutions
- Kris Zibert Allgeier, Martin and Associates
- Leal Gustavo Dominion Energy
- Thomas Dauzat GE
- Tim-Felix Mai Siemens
- Shankar Subramany Kema

8.4 OUTSTANDING SERVICE AWARDS, FOUR TOTAL

For long-term commitment, dedication, and contributions to the Transformers Committee.

- Wally Binder
- Jack Harley
- Dan Mulkey
- Steve Shull

8.5 IEEE-SA STANDARDS MEDALLION

8.5.1 Stephen Shull (award to be presented to Steve by IEEE-SA in December)

For major contributions to the development of standards, including leadership in standardization of new technologies, assuring achievement of standards development goals, identifying opportunities to better serve the needs of standards users or other such contributions viewed as deserving of this award.

8.6 CIGRE BEST PAPER AWARD – PARIS 2018 SESSION

8.6.1 Luiz Cheim, ABB USA

This is for honorable mention only. Since one of our Members received a Cigre Best Paper Award, I thought it nice to make his colleagues in the Transformers Committee aware of this international recognition. The paper will be published in Electra Magazine in 2019.

Paper A2-206. *Machine Learning Tools in Support of Transformer Diagnostics*.

The paper describes the use of Machine Learning (ML) algorithms as supporting tools for the automatic classification of power transformer operating condition. HF transformer modeling has been applied in transformer design and transient studies but it could also be a support to FRA analyses and PD localization. Internal resonance is an important phenomenon and together with FT/VFT may explain a significant number

of unknown transformer faults. ML has also been shown to be a powerful approach to improve transformer diagnostics.

8.7 WORKING GROUP AWARDS

In addition to the Committee Awards above, the IEEE SA SB presents its own Award to the WG Chair upon publication of a new or revised document and offers the WG Chair the opportunity to nominate significant contributors to the project for an IEEE SA SB Certificate of Appreciation.

1. C57.12.36 WG Chair Jerry Murphy. IEEE Standard Requirements for Liquid-Immersed Distribution Substation Transformers. Published in 2017. Status: Confirmed delivery to Steve, May 17. 1 Wood plaque: Carlos Gaytan Vice-Chair. 4 Certificates of Appreciation: Steve Shull, Wally Binder, Gary Hoffman, Martin Rave.
2. C57.12.39 WG Chair Carlos Gaytan. Standard Requirements for Distribution Transformer Tank Pressure Coordination. Status: Confirmed delivery to Steve, early July 2018. 3 Wood plaques: Carlos Gaytan, Jeremy Van Horn (Secretary), Justin Pezzin. 6 Certificates of Appreciation: Ron Stahara, Brian Klaponski, Dan Mulkey, Christopher Sullivan, Steve Shull, Alan Wilks.
3. C57.12.58 WG Chair - Roger Wicks. Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil. Status: Confirmed delivery to Steve. 1 Wood plaque: Roger Wicks. 2 Certificates of Appreciation: Casey Ballard, Tim-Felix Mai.
4. C57.19.01 WG Chair Shibao Zhang Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings. Status: Confirmed delivery to Steve July. 2 Wood plaques: Shibao Zhang, David Wallach (Secretary). 3 Certificates of Appreciation: Weijun Li, Devki Sharma, Dave Geibel.
5. C57.119 WG Chair Gael Kennedy. Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings. Status: Confirmed delivery to Steve, July 1 & 30. 2 Wood plaques: Gael Kennedy, Tom Prevost. 3 Certificates of Appreciation: Juan Castellanos, Marion Jaroszewski, Patrick McShane.
6. C57.147 WG Chair Patrick McShane. Guide for Acceptance and Maintenance of Natural Ester Insulating Liquid in Transformers. 3 Wood plaques: WG Chair Charles (Patrick) McShane; Vice-Chair Clair Claiborne; Secretary Jim Graham.
7. C57.158 WG Chair Enrique Betancourt, Guide for the Application of Tertiary and Stabilizing Windings in Power Transformers. Status: Confirmed delivery to Steve. 3 Wood plaques: Enrique Betancourt, Brian Penny Vice-Chair, Marnie Roussell Secretary. 3 Certificates of Appreciation: Hemchandra Shertukde, Jose opez Fernandez, Vijayan Krishnamurthy.
8. C57.12.40 WG Chair Brian Klaponski. Standard for Network Three Phase Transformers, 2500 kVA and Smaller, High-Voltage 34,500 V and Below, Low Voltage 600 V and Below, Subway & Vault Type (Liquid Immersed). Confirmed delivery to Steve, May 29. 2 Wood plaques: Brian Klaponski, Giuseppe Termini Secretary. 10 Certificates of Appreciation for: William Wimmer, Lee Welch, Jeremy Sewell, George Payerle, Daniel Mulkey, Charles Morgan, Alejandro Macias, Will Elliott, James Dorsten, Larry Dix.

Awards already distributed:

9. C57.106 WG Chair - Bob Rasor. Guide for Acceptance and Maintenance of Insulating Mineral Oil in Electrical Equipment. Status: several Emails with WG awards Form has been sent to bob.rasor@sdmyers.com and hali.moleski@sdmyers.com to notify about the need for information. Received recognition at Spring 2018 Pittsburgh luncheon and physical awards at Fall 2018 Jacksonville.

10. C57.12.10 WG Chair Gary Hoffman, Standard Requirements for Liquid-Immersed Power Transformers. WG Chair confirmed received awards, July 20 email. Brian Penny, Scott Digby, Mark Tostrud, Joe Watson, Ryan Musgrove, Waldemar Ziomek.
11. C57.13.1 WG Chair Bruce Magruder. Guide for Field Testing of Relaying Current Transformers. WG Chair confirmed received awards.
12. C57.12.24 – WG Chair confirmed received awards.
13. C57.140-2017 WG Chair confirmed received awards.
14. C57.138-2016 WG Chair confirmed received awards.
15. C57.163 COR 1. Sent to recipients via Fed Ex and confirmed.
16. C57.12.20 WG Chair - Alan Traut. Standard for Overhead-Type Distribution Transformers 500 kVA and Smaller: High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below. WG Chair confirmed received awards; he said he would distribute himself 5/6 and 5/17 emails. Received recognition at Spring 2018 Pittsburgh luncheon.
17. C57.120 WG Chair – Roger Verdolin. Guide for Loss Evaluation of Distribution and Power Transformers and Reactors. WG Chair confirmed received awards. Received recognition at Spring 2018 Pittsburgh luncheon.
18. 60076-57-129 WG Chair – Ulf Radbrandt. Standard for General Requirements and Test Code for Oil-Immersed HVDC Converter Transformer. Status: WG Chair confirmed received awards. Received recognition at Spring 2018 Pittsburgh luncheon.

Not Done Yet:

a) C57.19.04 WG Chair Scott Digby. Standard Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A in Bus Enclosures. Status: Waiting on publishing of the cover that is due 09/04/2018. WG submitted request.

b) C57.15 WG Chair Craig Colopy. Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators. Status: waiting on cover to be published to submit to vendor for award processing. May 31 email Craig will have awards sent to Steve.

c) C57.12.38/Cor 1-2016 - sent email reminder again from the March, April, May 2018 and July 30 & 31. cc'ed Malia and Steve.

8.8 OTHER AWARDS

See the Awards Guidebook on our website http://www.transformerscommittee.org/ for other award opportunities. The guidebook provides a reference for the awards that are available to the PES Technical Committees volunteers each year. The intent is to provide one reference point to assist the PES Technical Committees in recognizing the volunteers who donate their time and expertise to the betterment of the industry and society overall. This is meant to supplement, not replace the PES Awards web page: https://www.ieee-pes.org/pes-communities/awards.

Respectfully submitted,

Stephen Antosz

Chair, Recognition & Awards Subcommittee
IEEE PES Transformers Committee

October 14, 2018

9.0 ADMINISTRATIVE SUBCOMMITTEE MEETING REPORT

9.1 INTRODUCTION OF MEMBERS AND GUESTS

The Chair called the meeting to order and asked attendees to introduce themselves and their affiliation. Consultants were asked to identify the company they were representing if they were not representing their own consulting interest. Introductions were made by members and guests.

Members and Guests Present:

Chair	Susan McNelly
Secretary	Ed teNyenhuis
Treasurer	Paul Boman
Standards Coordinator	Jim Graham
Awards/Past Chair	Stephen Antosz
Bushings	Peter Zhao
Dielectric Tests	Ajith Varghese
Distribution Transformers	Stephen Shull
Dry Type Transformers	Casey Ballard
HVDC Converter Transformers & Reactors	Michael Sharp
Instrument Transformers	Ross McTaggart
Insulating Fluids	David Wallach
Insulation Life	Sheldon Kennedy
Performance Characteristics	Craig Stiegemeier
Power Transformers	Bill Griesacker
Standards	Jerry Murphy
Underground Transformers & Network Protectors	Dan Mulkey

Guests: Malia Zaman, Ed Smith

Absent: Bruce Forsyth. Tammy Behrens

9.2 APPROVAL OF PREVIOUS MEETING MINUTES

The Chair asked for comments of the Spring 2018 Administrative Subcommittee meeting minutes. A motion to approve the minutes was given by Jerry Murphy (seconded by Steve Shull). There were no comments and no objections to unanimous approval, therefore the minutes were approved.

9.3 ADDITIONS TO AND/OR APPROVAL OF THE AGENDA

The Chair noted a new item would be added under new business to the preliminary agenda that was previously distributed. A motion to approve the revised agenda was given by Ajith Varghese (seconded by Jerry Murphy) and there were no objections to unanimous approval of the revised agenda, therefore the below agenda was approved.

Approved Agenda:

1. Introduction of Members and Guests (:05) ..... All
2. Approval of Spring 2018 Minutes (:03) ..... Sue McNelly
3. Additions to and/or Approval of the Agenda (:02) ..... Sue McNelly
4. Chair's Report (:10) ..... Sue McNelly
5. Vice Chair's Report (:05) ..... Sue McNelly
6. Secretary's Report & New Committee Membership Approval (:15) ..... Ed teNyenhuis
7. Treasurer's Report (:05) ..... Paul Boman

Time Check (2:45 pm)

8. Recognition & Awards Report (:05) ..... Stephen Antosz
9. Standards Report (:20) ..... Jim Graham
10. IEEE Staff Update (:10) ..... Malia Zaman
11. Meeting Planning (:10) ..... Tammy Behrens

Time Check (3:30 pm) & Break (15 min)

12. Old Business
    12.1. Update on Entity Projects (:05) ..... Sue McNelly
13. New Business
    13.1. Revised Transformers Committee P&P Manual (:15)..... Sue McNelly
    13.2. Working Group Entity P&P ....Sue McNelly

Time Check – 4:35 PM

14. Subcommittee Reports – Roundtable (not intended to indicate order of reporting)
    14.1. Bushings (:03) ..... Peter Zhao
    14.2. Dielectric Test (:03) ..... Ajith Varghese
    14.3. Distribution Transformers (:03) ..... Steve Shull
    14.4. Dry Type Transformers (:03) ..... Casey Ballard
    14.5. HVDC (:03) ..... Mike Sharp
    14.6. Instrument Transformers (:03) ..... Ross McTaggart
    14.7. Insulating Fluids (:03) ..... David Wallach
    14.8. Insulation Life (:03) ..... Sheldon Kennedy
    14.9. Performance Characteristics (:03) ..... Craig Stiegemeier
    14.10. Power Transformers (:03) ..... Bill Griesacker
    14.11. Standards (:03) ..... Jerry Murphy
    14.12. Subsurface Transformers & Network Protectors (:03) ..... Dan Mulkey
15. Adjourn

9.4 CHAIR'S REPORT – SUE MCNELLY

Refer to Section 4.0 of the Main Minutes for a complete "Chair's Report."

9.5 VICE CHAIR'S REPORT – BRUCE FORSYTH

Refer to Section 5.0 of the Main Minutes for a complete "Vice Chair's Report."

9.6 SECRETARY'S REPORT – ED TENYENHUIS

Refer to Section 6.0 of the Main Minutes for a complete "Secretary's Report."

Highlights:

- There were 10 applications for Committee Membership since the last meeting. A motion was made by Craig Stiegemeier (seconded by Jim Graham) to approve all 10 applications. The motion was approved unanimously.
- SC Chairs were asked to submit their minutes not later than Nov 29, 2018.

9.7 TREASURER'S REPORT – PAUL BOMAN

Refer to Section 7.0 of the Main Minutes for a complete "Treasurer's Report."

9.8 RECOGNITION & AWARDS REPORT – STEPHEN ANTOSZ

Refer to Section 8.0 of the Main Minutes for a complete "Recognition & Award's Report."

9.9 STANDARDS REPORT – JIM GRAHAM

Refer to Section 10.0 of the Main Minutes for a complete "Standards Report."

9.10 IEEE STAFF UPDATE – MALIA ZAMAN

Refer to Appendix 7 for the full PowerPoint presentation.

9.11 MEETING PLANNING REPORT – TAMMY BEHRENS

No report was given.

9.12 OLD BUSINESS

There was no update on the Entity projects in process.

9.13 NEW BUSINESS

9.13.1 Updated Transformers Committee P&P Manual

A motion for Adcom to approve the Updated Transformers Committee P&P Manual was given by Jim Graham (seconded by Jerry Murphy) and there were no objections to unanimous approval of the motion.

The revised Transformer Committee P&P Manual will be voted on Monday at the Main Meeting.

AdCom discussed and agreed that the Comment Resolution Group (CRG) should vote at a simple majority when reviewing comments and, they also agreed that if the comments were brought back to the WG for consideration the voting requirements would also be a simple majority

9.13.2 Working Group Entity P&P

Bruce Forsyth will be chair of a Task Force to develop a working group entity P&P.

9.14 SUBCOMMITTEE REPORTS

Steve Shull announced that he would resign as Chair of the Distribution Transformers Subcommittee after this meeting. He will be replaced by Ed Smith. Steve was thanked by the Adcom for his long service as SC Chair.

9.15 ADJOURNMENT

The meeting was adjourned at 5.03 PM.

Submitted by:

Ed teNyenhuis,
Secretary, Transformers Committee

10.0 STANDARDS REPORT – JIM GRAHAM

The Standard Report was presented at the Monday General Session.

The semi-annual Standards Report is included as **Appendix 2.**

11.0 LIAISON REPORTS

11.1 CIGRE – CRAIG SWINDERMAN

Craig Swinderman prepared a presentation which is shown in Appendix 3.

11.2 IEC TC-14 – PHIL HOPKINSON

Phil Hopkinson presented an overview of TC14 activities. His presentation is available in Appendix 4.

11.3 STANDARDS COORDINATING COMMITTEE NO. 18 (NFPA/NEC) – DAVID BRENDER

To; Sue McNelly, Chair
IEEE Transformers Committee
October 15, 2018

Report on Changes to the 2020 NEC of interest to IEEE Transformers Committee

1. The closing date for public comments on proposed changes to the 2017 NEC has passed.
2. The 2020 National Electrical Code is in the First Revision stage. NEC Panels will meet the last two weeks of October to address Public Inputs received concerning the First Revision.
3. Article 450 specifically addresses transformers. There were no significant changes to Art. 450. The changed proposed are editorial in nature only.
4. Panel voting on the Public Inputs will take place in January, 2019.
5. IEEE representation on the NEC is through the IEEE SCC18. As of the last report, the IEEE seats on Panel 9 (which has responsibility for Article 450) are vacant (both Principal and Alternate). Please contact me regarding questions on joining SCC18.

Respectfully,
David Brender, P.E.
Email: dbrender@IEEE.org
Phone: 561-894-8901

11.4 STANDARDS COORDINATING COMMITTEE NO. 4 (ELECTRICAL INSULATION) – EVANNE WANG

Standards Coordinating Committee 04 oversees development of standards for Electrical Insulation that span the scope of multiple Technical Committees and Societies (e.g., Dielectric and Electrical Insulation, and Power Engineering) within IEEE.

1. **Scope:**
   - To formulate guiding principles for the evaluation of insulation materials and systems for electrical and electronic applications.

- To formulate principles for the identification of insulation materials and systems based on functional tests and/or experience.
- To coordinate the preparation of standards for functional test programs and diagnostic methods for the evaluation of insulation materials and systems.

2. **Standards:**
   - **IEEE 1-2000 (R2011)** Recommended Practice – General Temperature Limits in the Rating of Electrical Equipment and for the Evaluation of Electrical Insulation
   - **IEEE 98-2016** Standard for the Preparation of Test Procedures for the Thermal Evaluation of Solid Electrical Insulating Materials
   - **IEEE 99-2008** Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment

3. Current Activities:

- **IEEE 99** – PAR expires December 2020. Document is in ballot, which closes 10/26/18.
- **IEEE 1 –** Soliciting volunteers for review and revision of this standard which expires 12/31/21.

For those interested in joining SCC04 or WG for revision of IEEE 1, please contact the Chairperson, Evanne Wang: evanne.wang@dupont.com, or Paulette Payne Powell: papayne@ieee.org

Respectfully submitted,

Evanne Wang

11.5 ASTM D27 – Tom Prevost

Tom Prevost prepared a presentation which is shown in Appendix 5.

12.0 Hot Topics for the Upcoming Week

The Subcommittee Chairs gave a very brief update on topics of special importance being addressed during the week.

13.0 Opening Session Adjournment

The meeting adjourned at 9:15 AM.

Thursday Closing Session

14.0 Chair's Remarks and Announcements

The Chair called the meeting to order at 10:50 AM.

15.0 Meetings Planning SC Minutes & Report – Tammy Behrens

See Appendix 6.

16.0 Reports from Technical Subcommittees (decisions made during the week)

Reports from each Technical SC were presented. The complete minutes for each SC meeting are included in full in the attached Annexes.

16.1 Dielectric Test SC (Ajith Varghese)

See unapproved minutes in the Annex.

16.2 Distribution Transformers SC (Steve Shull)

See unapproved minutes in the Annex.

16.3 Dry Type Transformers SC (Charles Johnson, presented by Casey Ballard)

See unapproved minutes in the Annex.

16.4 HVDC Converter Transformers SC (Mike Sharp)

See unapproved minutes in the Annex.

16.5 Instrument Transformers SC (Ross McTaggart)

See unapproved minutes in the Annex.

16.6 Insulating Fluids SC (David Wallach)

See unapproved minutes in the Annex.

16.7 Insulation Life SC (Sheldon Kennedy)

See unapproved minutes in the Annex.

16.8 Performance Characteristics SC (Craig L Stiegemeier)

See unapproved minutes in the Annex.

16.9 POWER TRANSFORMERS SC (BILL GRIESACKER)

See unapproved minutes in the Annex.

16.10 STANDARDS SC (JERRY MURPHY)

See unapproved minutes in the Annex.

16.11 UNDERGROUND TRANSFORMERS & NETWORK PROTECTORS SC (DAN MULKEY)

See unapproved minutes in the Annex.

16.12 BUSHINGS SC (PETER ZHAO)

See unapproved minutes in the Annex.

17.0 REPORTS FROM STANDARDS SUBCOMMITTEE AND STANDARDS (ISSUES FROM THE WEEK)

Jim Graham reminded the WG chairs of the approval levels necessary for accepting comment resolution group recommendations by the WG and WG approval to recirculate a revised draft. Majority approval is required to accept Comment Resolution Group (CRG) recommendations and to initiate a recirculation of a revised draft. A 2/3 supermajority is required when voting to submit a draft for initial ballot or to rescind a draft.

18.0 NEW BUSINESS

No other new business was raised.

19.0 CLOSING SESSION ADJOURNMENT

The meeting was adjourned at 12:00 PM.

APPENDIX 1

Meeting Schedule

IEEE PES TRANSFORMERS COMMITTEE

10/9/2018

FALL 2018 MEETING: OCTOBER 14 TO OCTOBER 18

Hyatt Regency Jacksonville Riverfront Hotel; Jacksonville, Florida USA

-- Room locations designated as (1), (2), etc., indicate the "button to press" in the elevator.
For instance, a room on (1) is located on First Level, and a room on (2) is located on Second Level.

KEY

Note: A PC projector will be furnished in each meeting room. Arrive early to ensure equipment operates/syncs correctly.

> = activity continued into another session / from another session

++ = not a Transformers Committee activity

TBD = To Be Determined

TRACK LEGEND

Admin	Administrative SC	Ins Life	Insulation Life SC
Bush	Bushings SC	Instr TR	Instrument Transformers SC
DiTests	Dielectric Tests SC	Mtgs	Meetings Planning SC
Distr	Distribution Transformers SC	PCS	Performance Characteristics SC
Dry Type	Dry Type Transformers SC	Power	Power Transformers SC
HVDC	HVDC Converter Transfs. and Smoothing Reactors SC	STNP	Submersible Transf. & Network Protectors SC
IF	Insulating Fluids SC	Stds	Standards SC

STATUS LEGEND

N	New
I	In-Progress
NC	Near Completion
B	Ballot Stage

THURSDAY, OCTOBER 11

No Meeting Registration, Technical Tours, Spouse/Companion Tours, or Social Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)

FRIDAY, OCTOBER 12

No Meeting Registration, Technical Tours, Spouse/Companion Tours, or Social Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)

SATURDAY, OCTOBER 13

No Registration and no Meetings, Technical Tours, or Spouse/Companion Tours Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
6:00 PM – ???	Early Bird Event: River City Brewing Company	Social			

- Advance on-line registration required
- Meet in hotel lobby at 6:00 PM; take river taxi, Uber/Lyft or regular taxi across the river at own expense (1 mile / 6 minutes by car / 15 minutes by river taxi)
- Enjoy live music and house-brewed beer that pairs well with seafood, steaks and pasta at this pub with river and downtown views – order off the menu
- See flyer for details

SUNDAY, OCTOBER 14

No Technical Tours or Spouse/Companion Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
1:00 PM – 5:30 PM	Meeting Registration				Sky Bridge (2)
2:00 PM – 5:30 PM	Administrative Subcommittee - Closed meeting, by invitation only	Admin	S. McNelly	–	River Terrace 3 (3)
2:00 PM – 5:00 PM	NEMA Transformers - Closed meeting, by invitation only	++	J. Caskey	–	River Terrace 2 (3)
6:00 PM – 8:00 PM	Welcome Reception				River Deck 2 (3)

Renew old friendships and form new ones! This reception will be held outside (weather permitting) with spectacular views of the St. Johns River, Main Street Bridge and the Jacksonville skyline. Cash bars, plenty of fabulous food and live music will be provided. Please indicate whether you will attend this reception during the meeting registration process. All registered attendees and spouses/companions are welcome to attend.

IEEE PES TRANSFORMERS COMMITTEE

FALL 2018 MEETING: OCTOBER 14 TO OCTOBER 18

Hyatt Regency Jacksonville Riverfront Hotel; Jacksonville, Florida USA

MONDAY, OCTOBER 15 - Monday Breaks Sponsored by Meramec Instrument Transformers **

No Technical Tours or Social Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 5:00 PM	Meeting Registration				Sky Bridge (2)
7:00 AM – 7:50 AM	Newcomers Orientation - Breakfast meeting; arrive early! - Newcomers and guests are encouraged to attend!		B. Forsyth	–	River Terrace 1 (3)
7:00 AM – 7:50 AM	Distribution & STNP SC Leaders Coordination - Closed breakfast meeting, by invitation only	Distr/STNP	S. Shull / D. Mulkey	–	City Terrace 12 (3)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Conference Center A (3)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees				St. Johns (3)
8:00 AM – 9:15 AM	Opening Session - All registered meeting participants are encouraged to attend - See separate document on website for meeting agenda - *Attendance required to maintain Committee Member status*		S. McNelly	–	Grand Ballroom 4 & 5 (2)
9:15 AM – 3:15 PM	Spouses/Companions Tour: Amelia Isl./Fernandina Beach - Advance on-line registration required - Bus departs 9:15 AM from Newnan Street entrance and returns ~3:15 PM; includes lunch - See flyer for details	Tour			
9:15 AM – 9:30 AM	*Break (beverages only) - Sponsored by Meramec Instrument Transformers **				*Grand Ballroom Foyer (2)*
9:30 AM – 10:45 AM	WG Std Transf. Terminology C57.12.80	Stds	C. Claiborne	I	Grand Ballroom 1 (2)
9:30 AM – 10:45 AM	TF LTC Diagnostics	PCS	M. Ferreira	N	Grand Ballroom 2 & 3 (2)
9:30 AM – 10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	I	Grand Ballroom 4 (2)
9:30 AM – 10:45 AM	WG Thermal Evaluation C57.100	Ins Life	R. Wicks	N	Grand Ballroom 5 (2)
9:30 AM – 10:45 AM	WG Dry Type Reactors PC57.16	Dry Type	A. Del Rio	I	Grand Ballroom 6 (2)
9:30 AM – 10:45 AM	TF External Dielectric Clearances	DiTests	E. Davis	–	Grand Ballroom 7 (2)
10:45 AM – 11:00 AM	*Break (beverages only) - Sponsored by Meramec Instrument Transformers **				*Grand Ballroom Foyer (2)*
11:00 AM – 12:15 PM	WG Control Cabinets PC57.148	Power	J. Watson	I	Grand Ballroom 1 (2)
11:00 AM – 12:15 PM	WG Moisture in Insulation PC57.162	Ins Life	T. Prevost	I	Grand Ballroom 2 & 3 (2)
11:00 AM – 12:15 PM	WG Overhead Distr. Transf. C57.12.20	Distr	A. Traut	I	Grand Ballroom 4 (2)
11:00 AM – 12:15 PM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	–	Grand Ballroom 5 (2)
11:00 AM – 12:15 PM	WG Bushings Gen. Require. C57.19.00	Bush	P. Zhao	I	Grand Ballroom 6 (2)
11:00 AM – 12:15 PM	WG Ventilated Dry Type PC57.12.51	Dry Type	S. Som	I	Grand Ballroom 7 (2)
12:15 PM – 1:30 PM	Standards Development Review Luncheon Everyone is welcome to attend. All SC/WG/TF leaders are highly encouraged to attend. Doors open ~12:00 pm. Come early, get a good seat and start eating. Advance on-line registration required. Admission verified with RFID badge at the door. To listen to the presentation without eating lunch, arrive by 12:30 pm.				Conference Center A (3)
1:45 PM – 3:00 PM	WG Installation of Power Transf. C57.93	Power	M. Lau	B	Grand Ballroom 1 (2)
1:45 PM – 3:00 PM	TF Audible Sound Revision to Test Code	PCS	R. Girgis	–	Grand Ballroom 2 & 3 (2)
1:45 PM – 3:00 PM	WG 1-ph Padmount Dist Transf. C57.12.38	Distr	A. Ghafourian	I	Grand Ballroom 4 (2)
1:45 PM – 3:00 PM	WG Guide of FRA for Liquid Filled Transf. C57.149	PCS	C. Sweetser	I	Grand Ballroom 5 (2)
1:45 PM – 3:00 PM	WG Transformer Impulse Test Guide PC57.98	DiTests	T. Hochanh	N	Grand Ballroom 6 (2)
1:45 PM – 3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	I	Grand Ballroom 7 (2)
3:00 PM – 3:15 PM	*Break (beverages and treats) - Sponsored by Meramec Instrument Transformers **				*Grand Ballroom Foyer (2)*
3:15 PM – 4:30 PM	WG Bushing Applicat. Guide C57.19.100	Bush	T. Spitzer	I	Grand Ballroom 1 (2)
3:15 PM – 4:30 PM	WG Transformer Monitoring C57.143	Power	M. Spurlock	I	Grand Ballroom 2 & 3 (2)
3:15 PM – 4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	R. Stahara	I	Grand Ballroom 4 (2)
3:15 PM – 4:30 PM	TF PD Limits for Factory Tests	DiTests	V. Mehrotra	–	Grand Ballroom 5 (2)
3:15 PM – 4:30 PM	WG on Loss Measurement C57.123	PCS	E. teNyenhuis	N	Grand Ballroom 6 (2)
3:15 PM – 4:30 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	M. Sharp	–	Grand Ballroom 7 (2)
4:30 PM – 4:45 PM	*Break (beverages only) - Sponsored by Meramec Instrument Transformers **				*Grand Ballroom Foyer (2)*
4:45 PM – 6:00 PM	TF IEEE-IEC Cross Reference	Stds	V. Mehrotra	I	Grand Ballroom 1 (2)
4:45 PM – 6:00 PM	WG High Temp Liquid Transformers C57.154	Ins Life	R. Marek	N	Grand Ballroom 2 & 3 (2)
4:45 PM – 6:00 PM	WG Tank Pressure Coordinat. C57.12.39	Distr	C. Gaytan	I	Grand Ballroom 4 (2)
4:45 PM – 6:00 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	–	Grand Ballroom 5 (2)
4:45 PM – 6:00 PM	TF Bushing Overload	Bush	M. Weisensee	N	Grand Ballroom 6 (2)
4:45 PM – 6:00 PM	WG Sec. Network Protectors C57.12.44	STNP	M. Faulkner	NC	Grand Ballroom 7 (2)

IEEE PES TRANSFORMERS COMMITTEE

FALL 2018 MEETING: OCTOBER 14 TO OCTOBER 18

Hyatt Regency Jacksonville Riverfront Hotel; Jacksonville, Florida USA

TUESDAY, OCTOBER 16 - Tuesday Breaks Sponsored by M&I Materials **

No Technical Tours or Social Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 11:30 AM	Meeting Registration				Sky Bridge (2)
7:00 AM – 7:50 AM	EL&P Delegation (End-users only please) - Breakfast meeting; arrive early!		J. Murphy	–	City Terrace 12 (3)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Conference Center A (3)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees				St. Johns (3)
9:15 AM – 4:00 PM	Spouses/Companions Tour: St. Augustine Gilded Age - Advance on-line registration required - Bus departs 9:15 AM from Newnan Street entrance and returns ~4:00 PM; includes lunch - See flyer for details	Tour			
8:00 AM – 9:15 AM	WG Dry Type PD Detection PC57.124	Dry Type	T. Prevost / R. Marek	I	Grand Ballroom 1 (2)
8:00 AM – 9:15 AM	TF on Winding Insulation PF	DiTests	D. Robalino	–	Grand Ballroom 2 & 3 (2)
8:00 AM – 9:15 AM	WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32	Distr	D. Mulkey	I	Grand Ballroom 4 (2)
8:00 AM – 9:15 AM	WG Wind Turbine Generator Transformers, P60076-16	PCS	P. Hopkinson	B	Grand Ballroom 5 (2)
8:00 AM – 9:15 AM	WG Tap Changer Applicat. Guide 60214-2	Power	C. Colopy	B	Grand Ballroom 6 (2)
8:00 AM – 9:15 AM	WG Station Service Volt. Transf. C57.13.8	Instr TR	D. Wallace	I	Grand Ballroom 7 (2)
9:15 AM – 9:30 AM	*Break (beverages only) - Sponsored by M&I Materials **				*Grand Ballroom Foyer (2)*
9:30 AM – 10:45 AM	WG 1-Ph Submersible Transf. C57.12.23	STNP	A. Traut	NC	Grand Ballroom 1 (2)
9:30 AM – 10:45 AM	WG Shunt Reactors C57.21	PCS	S. Som	I	Grand Ballroom 2 & 3 (2)
9:30 AM – 10:45 AM	WG Temp Measurement PC57.165	Ins Life	P. McClure	I	Grand Ballroom 4 (2)
9:30 AM – 10:45 AM	TF Condition Assessment Guide	Power	B. Sparling	I	Grand Ballroom 5 (2)
9:30 AM – 10:45 AM	TF Low Frequency Test Guide	DiTests	D. Sauer	N	Grand Ballroom 6 (2)
9:30 AM – 10:45 AM	WG Tests for Instrument Transf. C57.13.5	Instr TR	P. Riffon	I	Grand Ballroom 7 (2)
10:45 AM – 11:00 AM	*Break (beverages only) - Sponsored by M&I Materials **				*Grand Ballroom Foyer (2)*
11:00 AM – 12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	D. Blew	N	Grand Ballroom 1 (2)
11:00 AM – 12:15 PM	WG Semicond. Power Rectifier Transfs C57.18.10	PCS	S. Kennedy	I	Grand Ballroom 2 & 3 (2)
11:00 AM – 12:15 PM	WG PLC Caps & CCVTs PC57.13.9	Instr TR	Z. Roman	I	Grand Ballroom 4 (2)
11:00 AM – 12:15 PM	WG Transportation Issues C57.150	Power	G. Anderson	I	Grand Ballroom 5 (2)
11:00 AM – 12:15 PM	WG PD Acoustic Detection C57.127	DiTests	D. Gross	I	Grand Ballroom 6 (2)
11:00 AM – 12:15 PM	WG Distrib. Transf. Bushings PC57.19.02	Bush	E. Smith	I	Grand Ballroom 7 (2)
12:15 PM – 1:30 PM	Awards Luncheon All meeting attendees are encouraged to attend to show appreciation and recognize accomplishments. Doors open ~12:00 pm. Come early, get a good seat and start eating. Advance on-line registration is required. Admission verified with RFID badge at the door.				Conference Center A (3)
1:45 PM – 3:00 PM	WG Submersible Transf. C57.12.24	STNP	G. Termini	N	Grand Ballroom 1 (2)
1:45 PM – 3:00 PM	TF Cont. Revision to Low Frequency Tests	DiTests	B. Griesacker	–	Grand Ballroom 2 & 3 (2)
1:45 PM – 3:00 PM	WG Instrument Transf. Tests PC57.13.2	Instr TR	T. Sizemore	I	Grand Ballroom 4 (2)
1:45 PM – 3:00 PM	WG Consolidation Insulating Fluid Guides PC57.166	IF	T. Prevost	N	Grand Ballroom 5 (2)
1:45 PM – 3:00 PM					Grand Ballroom 6 (2)
1:45 PM – 3:00 PM	WG Therm Eval of Insul Systems, Dry Type C57.12.60	Dry Type	R. Wicks	I	Grand Ballroom 7 (2)
3:00 PM – 3:15 PM	*Break (beverages and pretzels) - Sponsored by M&I Materials **				*Grand Ballroom Foyer (2)*
3:15 PM – 4:30 PM	WG Partial Discharge Test - C57.113	DiTests	A. Naderian	N	Grand Ballroom 1 (2)
3:15 PM – 4:30 PM	WG Gas Interpretation Guide C57.104	IF	C. Beauchemin	B	Grand Ballroom 2 & 3 (2)
3:15 PM – 4:30 PM	WG High-Temp Insulat. Materials, P-1276	Ins Life	R. Wicks	I	Grand Ballroom 4 (2)
3:15 PM – 4:30 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	N	Grand Ballroom 5 (2)
3:15 PM – 4:30 PM					Grand Ballroom 6 (2)
3:15 PM – 4:30 PM	WG Std Terminal Markings C57.12.70	Stds	J. Varnell	I	Grand Ballroom 7 (2)
4:30 PM – 4:45 PM	*Break (beverages only) - Sponsored by M&I Materials **				*Grand Ballroom Foyer (2)*
4:45 PM – 6:00 PM	TF Cont. Rev to Imp. Test Sect of C57.12.00 & C57.12.90	DiTests	P. Riffon	–	Grand Ballroom 1 (2)
4:45 PM – 6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	I	Grand Ballroom 2 & 3 (2)
4:45 PM – 6:00 PM	WG Loading Guide PC57.91	Ins Life	D. Wallach	I	Grand Ballroom 4 (2)
4:45 PM – 6:00 PM	WG Short Circuit Withstand PC57.164	PCS	S. Patel	I	Grand Ballroom 5 (2)
4:45 PM – 6:00 PM					Grand Ballroom 6 (2)
4:45 PM – 6:00 PM	WG Guide for Monitoring Distr Transf PC57.167	Distr	G. Hoffman	N	Grand Ballroom 7 (2)

IEEE PES TRANSFORMERS COMMITTEE

FALL 2018 MEETING: OCTOBER 14 TO OCTOBER 18

Hyatt Regency Jacksonville Riverfront Hotel; Jacksonville, Florida USA

WEDNESDAY, OCTOBER 17 - Wednesday Breaks Sponsored by Brockhaus Measurements **

No Registration and no Technical Tours or Spouse/Companion Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Conference Center A (3)
7:00 AM – 8:00 AM	SC Meetings Planning - Breakfast meeting; arrive early! - All interested individuals welcome	Mtgs	T. Behrens	–	City Terrace 11 (3)
7:00 AM – 8:00 AM	IEC TC-14 Technical Advisory Group - Breakfast meeting; arrive early! - All interested individuals welcome	++	P. Hopkinson	–	River Terrace 2 (3)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				St. Johns (3)
8:00 AM – 9:15 AM	SC Instrument Transformers	Instr TR	R. McTaggart	–	Grand Ballroom 1 (2)
8:00 AM – 9:15 AM	SC Insulation Life	Ins Life	S. Kennedy	–	Grand Ballroom 5 (2)
9:15 AM – 9:30 AM	*Break (beverages only) - Sponsored by Brockhaus Measurements **				*Grand Ballroom Foyer (2)*
9:30 AM – 10:45 AM	SC Distribution Transformers	Distr	S. Shull	–	Grand Ballroom 2 & 3 (2)
9:30 AM – 10:45 AM	SC Bushings	Bush	P. Zhao	–	Grand Ballroom 5 (2)
10:45 AM – 11:00 AM	*Break (beverages only) - Sponsored by Brockhaus Measurements **				*Grand Ballroom Foyer (2)*
11:00 AM – 12:15 PM	SC Submersible Transf. & Network Protectors	STNP	D. Mulkey	–	Grand Ballroom 1 (2)
11:00 AM – 12:15 PM	SC Dielectric Test	DiTests	A. Varghese	–	Grand Ballroom 5 (2)
12:15 PM – 1:30 PM	*Lunch (on your own)*				
1:30 PM – 2:45 PM	SC Dry Type Transformers	Dry Type	C. Johnson	–	Grand Ballroom 1 (2)
1:30 PM – 2:45 PM	SC Power Transformers	Power	B. Griesacker	–	Grand Ballroom 5 (2)
2:45 PM – 3:00 PM	*Break (beverages and treats) - Sponsored by Brockhaus Measurements **				*Grand Ballroom Foyer (2)*
3:00 PM – 4:15 PM	SC Insulating Fluids	IF	D. Wallach	–	Grand Ballroom 2 & 3 (2)
3:00 PM – 4:15 PM	SC Performance Characteristics	PCS	C. Stiegemeier	–	Grand Ballroom 5 (2)
4:15 PM – 4:30 PM	*Break (beverages only) - Sponsored by Brockhaus Measurements **				*Grand Ballroom Foyer (2)*
4:30 PM – 5:45 PM	SC Standards	Stds	J. Murphy	–	Grand Ballroom 2 & 3 (2)
6:15 PM – 9:30 PM	Evening Event: Dinner Social at Cummer Museum - Advance on-line registration required; admission confirmed with RFID name badge at entrance - First shuttle bus departs hotel's Newnan Street entrance at 6:15 PM for Cummer and will run every 15 minutes until 7:00 PM - Doors open & event begins at 6:30 PM; exhibits, gardens & gift shop open 6:30–7:30 PM with passed appetizers, cash bar, live music — buffet dinner at 7:45 pm - See flyer for details				

THURSDAY, OCTOBER 18

No Meeting Registration, Technical Tours, Spouse/Companion Tours, or Social Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Conference Center A (3)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				St. Johns (3)
8:00 AM – 9:15 AM	Technical Presentation 1 Tutorial on the Guide for Application of Tertiary and Stabilizing Windings By: Enrique Betancourt (Chairman of working group) and other key working group members (TBD) See flyer on website for details **	Tutorial			Grand Ballroom 4 & 5 (2)
9:15 AM – 9:30 AM	*Break (beverages only)*				*Grand Ballroom Foyer (2)*
9:30 AM – 10:45 AM	Technical Presentation 2 Condition Assessment of Power Transformers and Assessment Indices Cigré WG A2.49 By: Brian Sparling, Ed teNyenhuis, Joe Watson and Thomas Prevost See flyer on website for details **	Tutorial			Grand Ballroom 4 & 5 (2)
10:45 AM – 11:00 AM	*Break (beverages only)*				*Grand Ballroom Foyer (2)*
11:00 AM – 12:00 PM	Closing Session - All attendees are encouraged to attend - See separate document on website for meeting agenda				Grand Ballroom 4 & 5 (2)
12:00 PM	*Lunch (on your own)*				
1:00 PM – 6:00 PM	Cigre A2.53 M - Closed meeting, by invitation only		P. Picher		Clearwater (3)

*** Contact Ed Smith (edsmith@ieee.org) if you are interested in sponsoring a day of coffee breaks at a future meeting.**

**** Contact Tom Prevost (tprevost@ieee.org) if you are interested in making a technical presentation at a future meeting.**

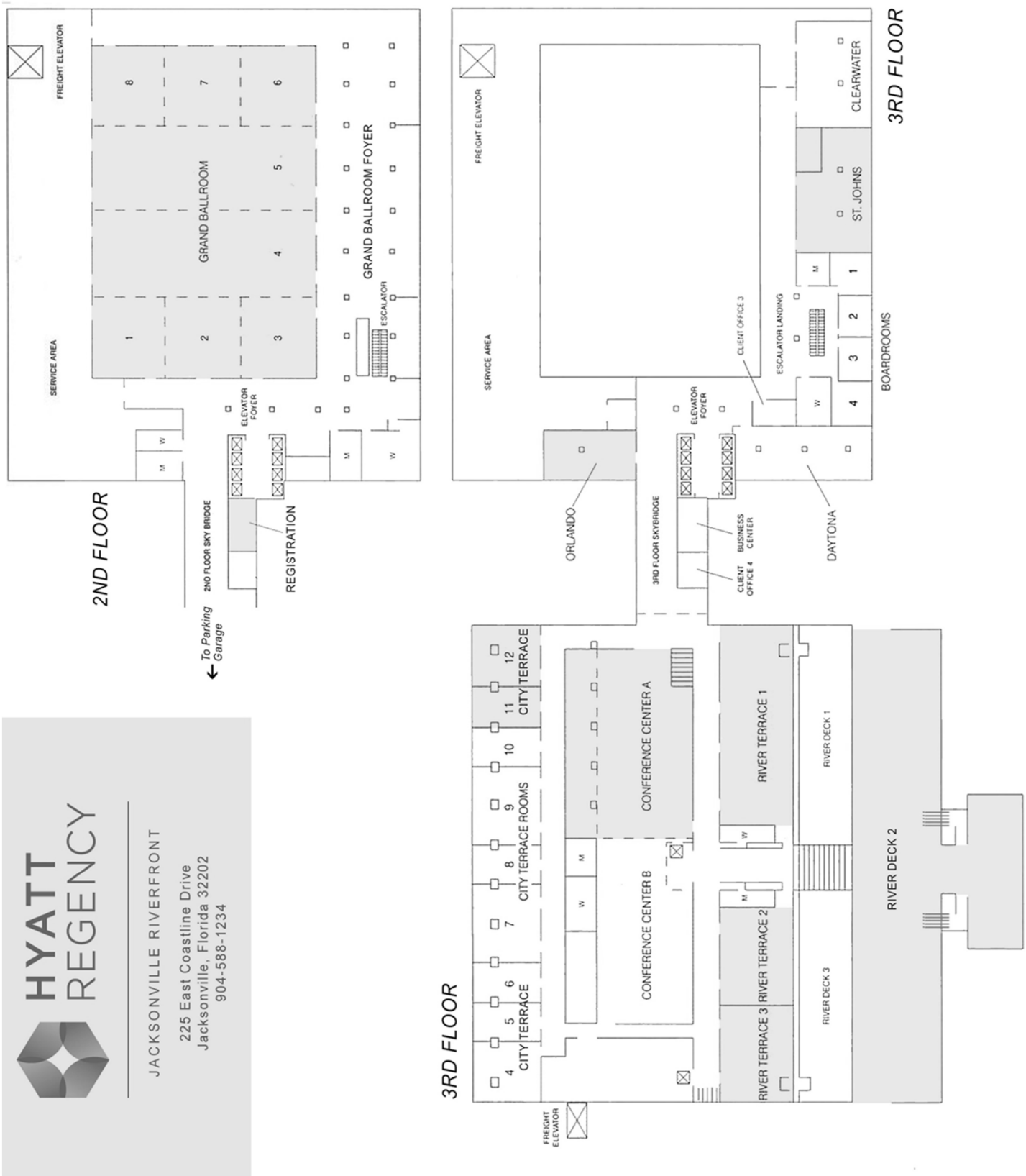
FRIDAY, OCTOBER 19

No Meeting Registration, Technical Tours, Spouse/Companion Tours, or Social Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
8:00 AM – 6:00 PM	Cigre A2.53 M - Closed meeting, by invitation only		P. Picher		Clearwater (3)

FUTURE COMMITTEE MEETINGS

Spring 2019: March 24–28; Anaheim, California, USA
Fall 2019: October 27–31; Columbus, Ohio, USA


HYATT REGENCY
JACKSONVILLE RIVERFRONT
225 East Coastline Drive
Jacksonville, Florida 32202
904-588-1234
2ND FLOOR
SERVICE AREA
FREIGHT ELEVATOR
GRAND BALLROOM
GRAND BALLROOM FOYER
ESCALATOR
ELEVATOR FOYER
2ND FLOOR SKY BRIDGE
REGISTRATION
To Parking Garage
3RD FLOOR
ORLANDO
3RD FLOOR SKYBRIDGE
BUSINESS CENTER
CLIENT OFFICE 4
CLIENT OFFICE 3
ESCALATOR LANDING
DAYTONA
BOARDROOMS
ST. JOHNS
CLEARWATER
CITY TERRACE
CITY TERRACE ROOMS
CONFERENCE CENTER A
CONFERENCE CENTER B
RIVER TERRACE 1
RIVER TERRACE 2
RIVER TERRACE 3
RIVER DECK 1
RIVER DECK 2
RIVER DECK 3

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IEEE PES TRANSFORMERS COMMITTEE

SUBCOMMITTEE MEETING LIST

FALL 2018 MEETING: OCTOBER 14 TO OCTOBER 18
Hyatt Regency Jacksonville Riverfront Hotel; Jacksonville, Florida USA

Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
10/14/2018	2:00 PM	5:30 PM	Administrative Subcommittee - Closed meeting, by invitation only	Admin	S. McNelly	River Terrace 3 (3)
10/15/2018	11:00 AM	12:15 PM	WG Bushings Gen. Require. C57.19.00	Bush	P. Zhao	Grand Ballroom 6 (2)
10/15/2018	3:15 PM	4:30 PM	WG Bushing Applicat. Guide C57.19.100	Bush	T. Spitzer	Grand Ballroom 1 (2)
10/15/2018	4:45 PM	6:00 PM	TF Bushing Overload	Bush	M. Weisensee	Grand Ballroom 6 (2)
10/16/2018	11:00 AM	12:15 PM	WG Distrib. Transf. Bushings PC57.19.02	Bush	E. Smith	Grand Ballroom 7 (2)
10/17/2018	9:30 AM	10:45 AM	SC Bushings	Bush	P. Zhao	Grand Ballroom 5 (2)
10/15/2018	9:30 AM	10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	Grand Ballroom 4 (2)
10/15/2018	11:00 AM	12:15 PM	WG Overhead Distr. Transf. C57.12.20	Distr	A. Traut	Grand Ballroom 4 (2)
10/15/2018	1:45 PM	3:00 PM	WG 1-ph Padmount Dist Transf. C57.12.38	Distr	A. Ghafourian	Grand Ballroom 4 (2)
10/15/2018	3:15 PM	4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	R. Stahara	Grand Ballroom 4 (2)
10/15/2018	4:45 PM	6:00 PM	WG Tank Pressure Coordinat. C57.12.39	Distr	C. Gaytan	Grand Ballroom 4 (2)
10/16/2018	8:00 AM	9:15 AM	WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32	Distr	D. Mulkey	Grand Ballroom 4 (2)
10/16/2018	4:45 PM	6:00 PM	WG Guide for Monitoring Distr Transf PC57.167	Distr	G. Hoffman	Grand Ballroom 7 (2)
10/17/2018	9:30 AM	10:45 AM	SC Distribution Transformers	Distr	S. Shull	Grand Ballroom 2 & 3 (2)
10/15/2018	7:00 AM	7:50 AM	Distribution & STNP SC Leaders Coordination - Closed breakfast meeting, by invitation only	Distr/STNP	S. Shull / D. Mulke	City Terrace 12 (3)
10/15/2018	9:30 AM	10:45 AM	TF External Dielectric Clearances	DiTests	E. Davis	Grand Ballroom 7 (2)
10/15/2018	1:45 PM	3:00 PM	WG Transformer Impulse Test Guide PC57.98	DiTests	T. Hochanh	Grand Ballroom 6 (2)
10/15/2018	3:15 PM	4:30 PM	TF PD Limits for Factory Tests	DiTests	V. Mehrotra	Grand Ballroom 5 (2)
10/16/2018	8:00 AM	9:15 AM	TF on Winding Insulation PF	DiTests	D. Robalino	Grand Ballroom 2 & 3 (2)
10/16/2018	9:30 AM	10:45 AM	TF Low Frequency Test Guide	DiTests	D. Sauer	Grand Ballroom 6 (2)
10/16/2018	11:00 AM	12:15 PM	WG PD Acoustic Detection C57.127	DiTests	D. Gross	Grand Ballroom 6 (2)
10/16/2018	1:45 PM	3:00 PM	TF Cont. Revision to Low Frequency Tests	DiTests	B. Griesacker	Grand Ballroom 2 & 3 (2)
10/16/2018	3:15 PM	4:30 PM	WG Partial Discharge Test - C57.113	DiTests	A. Naderian	Grand Ballroom 1 (2)
10/16/2018	4:45 PM	6:00 PM	TF Cont. Rev to Imp. Test Sect of C57.12.00 & C57.12.90	DiTests	P. Riffon	Grand Ballroom 1 (2)
10/17/2018	11:00 AM	12:15 PM	SC Dielectric Test	DiTests	A. Varghese	Grand Ballroom 5 (2)
10/15/2018	9:30 AM	10:45 AM	WG Dry Type Reactors PC57.16	Dry Type	A. Del Rio	Grand Ballroom 6 (2)
10/15/2018	11:00 AM	12:15 PM	WG Ventilated Dry Type PC57.12.51	Dry Type	S. Som	Grand Ballroom 7 (2)
10/15/2018	1:45 PM	3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	Grand Ballroom 7 (2)
10/16/2018	8:00 AM	9:15 AM	WG Dry Type PD Detection PC57.124	Dry Type	T. Prevost / R. Ma	Grand Ballroom 1 (2)
10/16/2018	1:45 PM	3:00 PM	WG Therm Eval of Insul Systems, Dry Type C57.12.60	Dry Type	R. Wicks	Grand Ballroom 7 (2)
10/16/2018	4:45 PM	6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	Grand Ballroom 2 & 3 (2)
10/17/2018	1:30 PM	2:45 PM	SC Dry Type Transformers	Dry Type	C. Johnson	Grand Ballroom 1 (2)
10/15/2018	3:15 PM	4:30 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	M. Sharp	Grand Ballroom 7 (2)
10/16/2018	1:45 PM	3:00 PM	WG Consolidation Insulating Fluid Guides PC57.166	IF	T. Prevost	Grand Ballroom 5 (2)
10/16/2018	3:15 PM	4:30 PM	WG Gas Interpretation Guide C57.104	IF	C. Beauchemin	Grand Ballroom 2 & 3 (2)
10/17/2018	3:00 PM	4:15 PM	SC Insulating Fluids	IF	D. Wallach	Grand Ballroom 2 & 3 (2)
10/15/2018	9:30 AM	10:45 AM	WG Thermal Evaluation C57.100	Ins Life	R. Wicks	Grand Ballroom 5 (2)
10/15/2018	11:00 AM	12:15 PM	WG Moisture in Insulation PC57.162	Ins Life	T. Prevost	Grand Ballroom 2 & 3 (2)
10/15/2018	4:45 PM	6:00 PM	WG High Temp Liquid Transformers C57.154	Ins Life	R. Marek	Grand Ballroom 2 & 3 (2)
10/16/2018	9:30 AM	10:45 AM	WG Temp Measurement PC57.165	Ins Life	P. McClure	Grand Ballroom 4 (2)
10/16/2018	3:15 PM	4:30 PM	WG High-Temp Insulat. Materials, P-1276	Ins Life	R. Wicks	Grand Ballroom 4 (2)
10/16/2018	4:45 PM	6:00 PM	WG Loading Guide PC57.91	Ins Life	D. Wallach	Grand Ballroom 4 (2)
10/17/2018	8:00 AM	9:15 AM	SC Insulation Life	Ins Life	S. Kennedy	Grand Ballroom 5 (2)
10/16/2018	8:00 AM	9:15 AM	WG Station Service Volt. Transf. C57.13.8	Instr TR	D. Wallace	Grand Ballroom 7 (2)
10/16/2018	9:30 AM	10:45 AM	WG Tests for Instrument Transf. C57.13.5	Instr TR	P. Riffon	Grand Ballroom 7 (2)
10/16/2018	11:00 AM	12:15 PM	WG PLC Caps & CCVTs PC57.13.9	Instr TR	Z. Roman	Grand Ballroom 4 (2)
10/16/2018	1:45 PM	3:00 PM	WG Instrument Transf. Tests PC57.13.2	Instr TR	T. Sizemore	Grand Ballroom 4 (2)
10/17/2018	8:00 AM	9:15 AM	SC Instrument Transformers	Instr TR	R. McTaggart	Grand Ballroom 1 (2)
10/17/2018	7:00 AM	8:00 AM	SC Meetings Planning - Breakfast meeting; arrive early! - All interested individuals welcome	Mtgs	T. Behrens	City Terrace 11 (3)

IEEE PES TRANSFORMERS COMMITTEE

SUBCOMMITTEE MEETING LIST

FALL 2018 MEETING: OCTOBER 14 TO OCTOBER 18
Hyatt Regency Jacksonville Riverfront Hotel; Jacksonville, Florida USA

Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
10/15/2018	9:30 AM	10:45 AM	TF LTC Diagnostics	PCS	M. Ferreira	Grand Ballroom 2 & 3 (2)
10/15/2018	11:00 AM	12:15 PM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	Grand Ballroom 5 (2)
10/15/2018	1:45 PM	3:00 PM	TF Audible Sound Revision to Test Code	PCS	R. Girgis	Grand Ballroom 2 & 3 (2)
10/15/2018	1:45 PM	3:00 PM	WG Guide of FRA for Liquid Filled Transf. C57.149	PCS	C. Sweetser	Grand Ballroom 5 (2)
10/15/2018	3:15 PM	4:30 PM	WG on Loss Measurement C57.123	PCS	E. teNyenhuis	Grand Ballroom 6 (2)
10/15/2018	4:45 PM	6:00 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	Grand Ballroom 5 (2)
10/16/2018	8:00 AM	9:15 AM	WG Wind Turbine Generator Transformers, P60076-16	PCS	P. Hopkinson	Grand Ballroom 5 (2)
10/16/2018	9:30 AM	10:45 AM	WG Shunt Reactors C57.21	PCS	S. Som	Grand Ballroom 2 & 3 (2)
10/16/2018	11:00 AM	12:15 PM	WG Semicond. Power Rectifier Transfs C57.18.10	PCS	S. Kennedy	Grand Ballroom 2 & 3 (2)
10/16/2018	3:15 PM	4:30 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	Grand Ballroom 5 (2)
10/16/2018	4:45 PM	6:00 PM	WG Short Circuit Withstand PC57.164	PCS	S. Patel	Grand Ballroom 5 (2)
10/17/2018	3:00 PM	4:15 PM	SC Performance Characteristics	PCS	C. Stiegemeier	Grand Ballroom 5 (2)
10/15/2018	11:00 AM	12:15 PM	WG Control Cabinets PC57.148	Power	J. Watson	Grand Ballroom 1 (2)
10/15/2018	1:45 PM	3:00 PM	WG Installation of Power Transf. C57.93	Power	M. Lau	Grand Ballroom 1 (2)
10/15/2018	3:15 PM	4:30 PM	WG Transformer Monitoring C57.143	Power	M. Spurlock	Grand Ballroom 2 & 3 (2)
10/16/2018	8:00 AM	9:15 AM	WG Tap Changer Applicat. Guide 60214-2	Power	C. Colopy	Grand Ballroom 6 (2)
10/16/2018	9:30 AM	10:45 AM	TF Condition Assessment Guide	Power	B. Sparling	Grand Ballroom 5 (2)
10/16/2018	11:00 AM	12:15 PM	WG Transportation Issues C57.150	Power	G. Anderson	Grand Ballroom 5 (2)
10/17/2018	1:30 PM	2:45 PM	SC Power Transformers	Power	B. Griesacker	Grand Ballroom 5 (2)
10/15/2018	9:30 AM	10:45 AM	WG Std Transf. Terminology C57.12.80	Stds	C. Claiborne	Grand Ballroom 1 (2)
10/15/2018	4:45 PM	6:00 PM	TF IEEE-IEC Cross Reference	Stds	V. Mehrotra	Grand Ballroom 1 (2)
10/16/2018	3:15 PM	4:30 PM	WG Std Terminal Markings C57.12.70	Stds	J. Varnell	Grand Ballroom 7 (2)
10/17/2018	4:30 PM	5:45 PM	SC Standards	Stds	J. Murphy	Grand Ballroom 2 & 3 (2)
10/15/2018	4:45 PM	6:00 PM	WG Sec. Network Protectors C57.12.44	STNP	M. Faulkner	Grand Ballroom 7 (2)
10/16/2018	9:30 AM	10:45 AM	WG 1-Ph Submersible Transf. C57.12.23	STNP	A. Traut	Grand Ballroom 1 (2)
10/16/2018	11:00 AM	12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	D. Blew	Grand Ballroom 1 (2)
10/16/2018	1:45 PM	3:00 PM	WG Submersible Transf. C57.12.24	STNP	G. Termini	Grand Ballroom 1 (2)
10/17/2018	11:00 AM	12:15 PM	SC Submersible Transf. & Network Protectors	STNP	D. Mulkey	Grand Ballroom 1 (2)

APPENDIX 2

Semi-Annual Standards Report

Standards Report

To: Members of Transformers Committee October 15, 2018

From: Jim Graham, Standards Coordinator

Executive Summary

This report covers Transformers Committee Standards activity from March 10, 2018 through September 27, 2018. During this time two new standards and three revisions to standards were approved by the Standards Board. In this same period, the Standards Board approved three PARs for new standards; four PARs for Revisions; one PAR for extension, and one PAR for withdrawal. All PARs scheduled to expire in 2018 have been completed, extended, or on a NesCom / RevCom agenda for approval.

Seventeen (17) standards were scheduled to expire in 2018. Eight of these standards will move to inactive status as of 31 December, 2018. Three (3) documents are in comment resolution; two have initiated the ballot process; and two are still in draft development. One standard (C57.136) will be intentionally allowed to expire. Seven (7) standards will expire in 2019, including two standards (C57.111 and C57.121) which will be intentionally allowed to expire.

In this Report:

I. Standards approved since March 10, 2018

Approved New Transformer Standards

P60076-16 IEC/IEEE International Draft Standard - Power Transformers - Part 16: Transformers for Wind Turbine Application

PC57.161 Guide for Dielectric Frequency Response Test

Approved Revisions to Transformer Standards *(All expire 31 Dec 2028)*

PC57.109 Guide for Liquid-Immersed Transformers Through-Fault-Current Duration

PC57.110 Recommended Practice for Establishing Liquid-Immersed and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents

PC57.119 Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings

Approved Standards Amendments & Corrigenda *None*

II. PARs approved since March 10, 2018

Approved PARs - Withdrawals

PC57.12.70-2011/Cor 1 Standard Terminal Markings and Connections for Distribution and Power Transformers - Corrigendum 1

Approved PARs for New Projects *(All expire December2022)*

PC57.167 Guide for Monitoring Distribution Transformers

PC57.168 Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers

PC57.12.200 Guide for the Frequency Domain Spectroscopy Measurement of Transformer Bushings
(ENTITY PAR)

Approved PARs for Revision of Standards *(All Expire December 2022)*

PC57.12.70 Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers

PC57.149 Guide for the Application and Interpretation of Frequency Response Analysis for Oil-Immersed Transformers

PC57.154 Standard for Liquid-Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems

PC57.98 Guide for Transformer Impulse Tests

Approved PAR Extensions *(All expire as noted)*

PC57.93 Guide for Installation and Maintenance of Liquid-Immersed Power Transformers **(December 2020**

Approved PAR Modifications *None (PAR Modifications do not change the Expiration Date)*

Approved PARs for Amendments & Corrigenda *None*

III. 2017 IEEE Standards Board Meeting Schedule

The Standards Board has three *physical* board meetings per year and three teleconference meetings. The IEEE 2018 Standards Association meetings schedule is appended to this report.

Deadlines for 2019 Standards Board Submissions:

Standards Board Meeting	**Submission Deadline**
January 2019 (teleconference)	**18 December, 2018**
March 2018	**08 February, 2019**
May 2018 (teleconference)	**22 March, 2019**
June 2019	**23 May, 2019**
September 2019 (teleconference)	**26 July, 2019**
November 2019	**17 September, 2019**
December 2019	**To be determined**

Please Note: Anything that expires at the end of 2019 must be submitted to NesCom (PARs) or RevCom (standards) by **17 September, 2018.** An updated submission deadline for the December 2019 Standards Board meetings is not available at this time.

IV. Transformers Committee Ballot Status *(as of SEP 27, 2018)*

PAR Number	Project Type	Approval Date	PAR Expiration	Invitation Close Date	Ballot Close Date	Status
Dielectric Test						
PC57.127	Revision	16-Feb-2015	12/31/2019			RevCom Agenda 12-Oct-2018
PC57.160	New	15-Jun-2017	12/31/2019	4/25/2018		Sponsor Ballot: PreBallot
Dry Type Transformers						
PC57.12.51	Revision	18-May-2017	12/31/2018	10/10/2018		Sponsor Ballot: Invitation
Insulating Fluids						
PC57.104	Revision	5-Feb-2010	12/31/2019	1/15/2018	6/26/2018	Sponsor Ballot: Comment Resolution
Instrument Transformers						
PC57.13.7	New	30-Sep-2010	12/31/2018	10/13/2016	12/13/2017	Sponsor Ballot: Comment Resolution
Performance Characteristics						
PC57.105	Revision	26-Mar-2015	12/31/2019	5/23/2018	9/24/2018	Sponsor Ballot: Comment Resolution
PC57.32a	Amendment	17-Feb-2017	12/31/2021	6/12/2018	7/13/2018	Sponsor Ballot: Comment Resolution
Power Transformers						
P60214-2	New	12-Jun-2014	12/31/2018	8/9/2017	1/31/2018	Sponsor Ballot: Comment Resolution
PC57.93	Revision	29-Mar-2012	12/31/2020	3/17/2018	9/21/2018	Sponsor Ballot: Comment Resolution
Subsurface Transformers & Network Protectors						
PC57.12.23	Revision	21-Aug-2014	12/31/2018			RevCom Agenda 04-Dec-2018

V. Transformers Committee Active PAR Status *(as of SEP 27, 2018)*

PAR Number	WG Chair	Project Type	Title	Approval Date	PAR Expiration	Status
Bushings						
PC57.19.00	Peter Zhao	Revision	Standard General Requirements and Test Procedure for Power Apparatus Bushings	15-Feb-2018	12/31/2022	WG Draft Development
PC57.19.02	Stephen Shull	New	Standard for the Design and Performance Requirements of Bushings Applied to Liquid Immersed Distribution Transformers	5-Feb-2016	12/31/2020	WG Draft Development
Dielectric Test						
PC57.113	Ali Naderian	Revision	Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors	6-Dec-2017	12/31/2021	WG Draft Development
PC57.127	Detlev Gross	Revision	Guide for the Detection, Location and Interpretation of Sources of Acoustic Emissions from Electrical Discharges in Power Transformers and Power Reactors	16-Feb-2015	12/31/2019	RevCom Agenda 12-Oct-2018
PC57.160	Thang Hochanh	New	Guide for the Electrical Measurement of Partial Discharges in High Voltage Bushings and Instrument Transformers	15-Jun-2017	12/31/2019	Sponsor Ballot: PreBallot
PC57.161	Ali Naderian	New	Guide for Dielectric Frequency Response Test	23-Aug-2013	12/31/2018	Complete
PC57.168	Daniel Sauer	New	Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers	14-Jun-2018	12/31/2022	WG Draft Development
Distribution Transformers						
PC57.12.32	Dan Mulkey	Revision	Standard for Submersible Equipment - Enclosure Integrity	11-Jun-2015	12/31/2019	WG Draft Development
PC57.12.34	Ron Stahara	Revision	Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 10 MVA and Smaller; High-Voltage, 34.5 kV Nominal System Voltage and Below; Low-Voltage, 15 kV Nominal System Voltage and Below	22-Sep-2016	12/31/2020	WG Draft Development
PC57.12.38	Ali Ghafourian	Revision	Standard for Pad-Mounted-Type, Self-Cooled, Single-Phase Distribution Transformers 250 kVA and Smaller: High Voltage, 34 500 GrdY/19 920 V and Below; Low Voltage, 480/240 V and Below	28-Sep-2017	12/31/2021	WG Draft Development

PAR Number	WG Chair	Project Type	Title	Approval Date	PAR Expiration	Status
Distribution Transformers						
PC57.167	Gary Hoffman	New	Guide for Monitoring Distribution Transformers	14-Jun-2018	12/31/2022	WG Draft Development
Dry Type Transformers						
PC57.12.01	Casey Ballard	Revision	Standard for General Requirements for Dry-Type Distribution and Power Transformers	12-May-2016	12/31/2020	WG Draft Development
PC57.12.51	Sanjib Som	Revision	Guide for Mechanical Interchangeability of Ventilated Dry Type Transformers	18-May-2017	12/31/2018	Sponsor Ballot: Invitation
PC57.12.60	Roger Wicks	Revision	Standard Test Procedure for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers	11-Jun-2015	12/31/2019	WG Draft Development
PC57.12.91	Derek Foster	Revision	Standard Test Code for Dry-Type Distribution and Power Transformers	3-Mar-2016	12/31/2020	WG Draft Development
PC57.16	Arturo Del Rio	Revision	Standard for Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors	5-Feb-2016	12/31/2020	WG Draft Development
PC57.124	Tom Prevost	Revision	Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers	15-Jun-2017	12/31/2021	WG Draft Development
HVDC Converter Transformers & Smoothing Reactors						
P1277	Klaus Pointer	Revision	Standard General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors and for Dry-Type Converter Reactors for DC Power Transmission	17-Feb-2017	12/31/2021	WG Draft Development
Insulating Fluids						
PC57.104	Claude Beauchemin	Revision	Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers	5-Feb-2010	12/31/2019	Sponsor Ballot: Comment Resolution
PC57.166	Tom Prevost	New	Guide for Acceptance and Maintenance of Insulating Liquids in Transformers and Related Equipment	8-Mar-2018	12/31/2022	WG Draft Development

PAR Number	WG Chair	Project Type	Title	Approval Date	PAR Expiration	Status
Insulation Life						
P1276	Roger Wicks	Revision	Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Distribution, Power and Regulating Transformers	27-Mar-2014	12/31/2018	WG Draft Development
PC57.162	Tom Prevost	New	Guide for the Interpretation of Moisture Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors	23-Aug-2013	12/31/2020	WG Draft Development
PC57.165	Phil McClure	New	Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors	17-Feb-2017	12/31/2021	WG Draft Development
PC57.91	Dave Wallach	Revision	Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators	28-Sep-2017	12/31/2021	WG Draft Development
Instrument Transformers						
PC57.13.2	Thomas Sizemore	Revision	Standard for Conformance Test Procedure for Instrument Transformers	6-Dec-2017	12/31/2021	WG Draft Development
PC57.13.5	Pierre Riffon	Revision	Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above	3-Mar-2016	12/31/2020	WG Draft Development
PC57.13.7	Henry Alton	New	Standard for Current Transformers with a Maximum mA Secondary Current of 250 mA	30-Sep-2010	12/31/2018	Sponsor Ballot: Comment Resolution
Instrument Transformers						
PC57.13.8	Dave Wallace	New	Standard Requirements for Station Service Voltage Transformers	11-Dec-2013	12/31/2019	WG Draft Development
PC57.13.9	Zoltan Roman	New	Standard for Power-Line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers	23-Mar-2017	12/31/2021	WG Draft Development

PAR Number	WG Chair	Project Type	Title	Approval Date	PAR Expiration	Status
Performance Characteristics						
P60076-16	Phil Hopkinson	New	Power Transformers - Part 16: Transformers for Wind Turbine Application	10-Dec-2014	12/31/2018	Complete
PC57.105	Roger Verdolin	Revision	Guide for Application of Transformer Connections in Three-Phase Electrical Systems	26-Mar-2015	12/31/2019	Sponsor Ballot: Comment Resolution
PC57.109	Vinay Mehrotra	Revision	Guide for Liquid-Immersed Transformers Through-Fault-Current Duration	26-Mar-2015	12/31/2019	Complete
PC57.123	Ed TeNyenhuis	Revision	Guide for Transformer Loss Measurement	15-Jun-2017	12/31/2021	WG Draft Development
PC57.142	James Mcbride	Revision	Guide to Describe the Occurrence and Mitigation of Switching Transients Induced by Transformers, Switching Device, and System Interaction	23-Mar-2017	12/31/2021	WG Draft Development
PC57.149	Charles Sweetser	Revision	Guide for the Application and Interpretation of Frequency Response Analysis for Oil-Immersed Transformers	14-Jun-2018	12/31/2022	WG Draft Development
PC57.164	Sanjay Patel	New	Guide for Establishing Short Circuit Withstand Capabilities of Liquid Immersed Power Transformers, Regulators, and Reactors	30-Jun-2016	12/31/2020	WG Draft Development
PC57.18.10	Sheldon Kennedy	Revision	Standard Practices and Requirements for Semiconductor Power Rectifier Transformers	30-Jun-2016	12/31/2020	WG Draft Development
PC57.21	Sanjib Som	Revision	Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA	21-Aug-2014	12/31/2018	WG Draft Development
PC57.32a	Sergio Panetta	Amendment	Standard for Requirements, Terminology, and Test Procedures for Neutral Grounding Devices Amendment: Neutral Grounding Resistor Section	17-Feb-2017	12/31/2021	Sponsor Ballot: Comment Resolution
Power Transformers						
P60214-1-57-131	Craig Colopy	New	Standard Requirements for Tap Changers	7-Dec-2016	12/31/2020	WG Draft Development
P60214-2	Craig Colopy	New	Tap-Changers - Part 2: Application Guide	12-Jun-2014	12/31/2018	Sponsor Ballot: Comment Resolution
PC57.143	Michael Spurlock	Revision	Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Components	17-Feb-2017	12/31/2021	WG Draft Development
PC57.148	Joe Watson	Revision	Standard for Control Cabinets for Power Transformers	30-Jun-2016	12/31/2020	WG Draft Development
PC57.150	Greg Anderson	Revision	Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Higher	23-Mar-2017	12/31/2021	WG Draft Development

PAR Number	WG Chair	Project Type	Title	Approval Date	PAR Expiration	Status
Power Transformers						
PC57.93	Mike Lau	Revision	Guide for Installation and Maintenance of Liquid-Immersed Power Transformers	29-Mar-2012	12/31/2020	Sponsor Ballot: Comment Resolution
Standards						
PC57.12.00	Steve Snyder	Revision	Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers	17-Feb-2017	12/31/2021	WG Draft Development
PC57.12.90	Stephen Antosz	Revision	Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers	6-Dec-2017	12/31/2021	WG Draft Development
PC57.12.70	Jason Varnell	Revision	Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers	14-Jun-2018	12/31/2022	WG Draft Development
PC57.12.80	Clair Claiborne	Revision	Standard Terminology for Power and Distribution Transformers	23-Mar-2017	12/31/2021	WG Draft Development
Subsurface Transformers & Network Protectors						
PC57.12.23	Allan Traut	Revision	Standard for Submersible Single-Phase Transformers: 250 kVA and Smaller; High Voltage 34 500GrdY/19 920V and Below; Low Voltage 600 V and Below	21-Aug-2014	12/31/2018	RevCom Agenda 04-Dec-2018
PC57.12.44	Mark Faulkner	Revision	Standard Requirements for Secondary Network Protectors	26-Mar-2015	12/31/2019	WG Draft Development

VI. Transformers Standards Status *(as of Sep 27, 2018)*

Standard Number	Year	Title	SASB Expiration	Notes
Bushings		**SC Chair: Peter Zhao email: peter.zhao@HydroOne.com phone: (417) 345-5926**		
C57.19.00	2004	IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings	12/31/2020	WG development PAR expires 12/31/2022
C57.19.01	2017	IEEE Standard for Performance Characteristics and Dimensions for Power Transformer and Reactor Bushings	12/31/2027	No PAR
65700-19-03	2014	IEC/IEEE International Standard -- Bushings for DC application	12/31/2024	No PAR
C57.19.04	2018	IEEE Standard for Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A in Bus Enclosures	12/31/2028	No PAR
C57.19.100	2012	IEEE Guide for Application of Power Apparatus Bushings	12/31/2022	No PAR
Dielectric Test		**SC Chair: Ajith Varghese email: ajith.varghese@spx.com phone: (262) 442-7197**		
C57.113	2010	IEEE Recommended Practice for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors	12/31/2020	PAR expires 2021
C57.127	2007	IEEE Guide for the Detection and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors	12/31/2018	RevCom Agenda 12-Oct-2018
C57.138	2016	IEEE Recommended Practice for Routine Impulse Tests for Distribution Transformers	12/31/2026	No PAR
C57.98	2011	IEEE Guide for Transformer Impulse Tests	12/31/2021	PAR expires 2022
Standard Number	**Year**	**Title**	**SASB Expiration**	**Notes**
Distribution Transformers		**SC Chair: Steve Shull email: sshull@empiredistrict.com phone: (417) 625-611**		
C57.12.39	2017	IEEE Standard for Requirements for Distribution Transformer Tank Pressure Coordination	12/31/2027	No PAR
C57.12.37	2015	IEEE Standard for the Electronic Reporting of Distribution Transformer Test Data	12/31/2025	No PAR
C57.12.20	2017	IEEE Standard for Overhead-Type Distribution Transformers 500 kVA and Smaller; High Voltage, 34 500 V and Below; Low Voltage, 7970/13 800Y V and Below	12/31/2027	No PAR
C57.12.28	2014	IEEE Standard for Pad-Mounted Equipment--Enclosure Integrity	12/31/2024	No PAR

Standard Number	Year	Title	SASB Expiration	Notes
Distribution Transformers		**SC Chair: Steve Shull email: sshull@empiredistrict.com phone: (417) 625-611**		
C57.12.29	2014	IEEE Standard for Pad-Mounted Equipment--Enclosure Integrity for Coastal Environments	12/31/2024	No PAR
C57.12.30	2010	IEEE Standard for Pole-Mounted Equipment--Enclosure Integrity for Coastal Environments	12/31/2020	No PAR
C57.12.31	2010	IEEE Standard for Pole-Mounted Equipment--Enclosure Integrity	12/31/2020	No PAR
C57.12.31-2010/Cor 1	2014	IEEE Standard for Pole-Mounted Equipment--Enclosure Integrity - Corrigendum 1: Correction to the SCAB Corrosion Test in 4.5.6	12/31/2024	No PAR
C57.12.32	2002	IEEE Standard for Submersible Equipment - Enclosure Integrity	12/31/2018	WG Draft Development PAR expires in 2019
C57.12.34	2015	IEEE Standard Requirements for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers, 10 MVA and Smaller; High-Voltage, 34.5 kV Nominal System Voltage and Below; Low-Voltage, 15 kV Nominal System Voltage and Below	12/31/2025	PAR expires in 2020
C57.12.35	2013	IEEE Standard Bar Coding for Distribution Transformers and Step-Voltage Regulators	12/31/2023	No PAR
C57.12.36	2017	IEEE Standard Requirements for Liquid-Immersed Distribution Substation Transformers	12/31/2027	No PAR
C57.12.38	2014	IEEE Standard for Pad-Mounted-Type, Self-Cooled, Single-Phase Distribution Transformers 250 kVA and Smaller: High Voltage, 34 500 GrdY/19 920 V and Below; Low Voltage, 480/240 V and Below	12/31/2024	PAR expires in 2021
C57.15	2017	IEEE Approved Draft Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators	12/31/2027	No PAR
Dry Type Transformers		**SC Chair: C.W. Johnson email: charles.w.johnson@us.abb.com phone: (276) 688-1512**		
C57.12.52	2012	IEEE Standard for Sealed Dry-Type Power Transformers, 501 kVA and Higher, Three-Phase, with High-Voltage 601 to 34500 Volts, Low-Voltage 208Y/120 to 4160 Volts--General Requirements	12/31/2022	No PAR
259	1999	IEEE Standard Test Procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General-Purpose Transformers	12/31/2020	No PAR
C57.12.01	2015	IEEE Standard for General Requirements for Dry-Type Distribution and Power Transformers	12/31/2025	PAR expires in 2020
C57.12.51	2008	IEEE Standard for Ventilated Dry- Type Power Transformers, 501 kVA and Larger, Three-Phase, with High- Voltage 601 V to 34 500 V; Low- Voltage 208Y/120 V to 4160 V- General Requirements	12/31/2018	Sponsor Ballot: Invitation PAR extension submitted
C57.12.58	2017	IEEE Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil	12/31/2027	No PAR

Standard Number	Year	Title	SASB Expiration	Notes
Dry Type Transformers		**SC Chair: C.W. Johnson email: charles.w.johnson@us.abb.com phone: (276) 688-1512**		
C57.12.59	2015	IEEE Guide for Dry-Type Transformer Through-Fault Current Duration	12/31/2025	No PAR
C57.12.60	2009	IEEE Standard Test Procedure for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers, Including Open-Wound, Solid-Cast, and Resin-Encapsulated Transformers	**12/31/2019**	**PAR expires in 2019**
C57.12.91	2011	IEEE Standard Test Code for Dry-Type Distribution and Power Transformers	12/31/2021	PAR expires in 2020
C57.124	1991	IEEE Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers	**12/31/2019**	**PAR expires in 2021**
C57.134	2013	IEEE Guide for Determination of Hottest-Spot Temperature in Dry-Type Transformers	12/31/2023	No PAR
C57.16	2011	IEEE Standard for Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors	12/31/2021	PAR expires in 2020
C57.94	2015	IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers	12/31/2025	No PAR
C57.96	2013	IEEE Guide for Loading Dry-Type Distribution and Power Transformers	12/31/2023	No PAR
HVDC Converter Transformers & Smoothing Reactors		**SC Chair: Mike Sharp email: mikes@ca.trenchgroup.com phone: 416-298-8108**		
1277	2010	IEEE Standard General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors for DC Power Transmission	12/31/2020	PAR expires in 2021
60076-57-129	2017	IEC/IEEE International Standard - Power transformers--Part 57-129: Transformers for HVDC applications	12/31/2027	No PAR
Standard Number	**Year**	**Title**	**SASB Expiration**	**Notes**
Insulating Fluids		**SC Chair: Dave Wallach email: david.wallach@duke-energy.com phone: (980) 373-4167**		
C57.637	2015	IEEE Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use	12/31/2025	No PAR
C57.104	2008	IEEE Guide for the Interpretation of Gases Generated in Oil-Immersed Transformers	12/31/2018	Sponsor Ballot Comment resolution 409 comments to review PAR expires in 2019
C57.106	2015	IEEE Guide for Acceptance and Maintenance of Insulating Mineral Oil in Electrical Equipment	12/31/2025	No PAR

Standard Number	Year	Title	SASB Expiration	Notes
Insulating Fluids		**SC Chair: Dave Wallach** **email: david.wallach@duke-energy.com** **phone: (980) 373-4167**		
C57.111	1989	IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers	12/31/2019	No PAR
C57.121	1998	IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers	12/31/2019	No PAR
C57.130	2015	IEEE Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors	12/31/2025	No PAR
C57.139	2015	IEEE Guide for Dissolved Gas Analysis in Transformer Load Tap Changers	12/31/2025	No PAR
C57.146	2005	IEEE Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers	12/31/2021	No PAR
C57.147	2018	IEEE Guide for Acceptance and Maintenance of Natural Ester Insulating Liquid in Transformers	12/31/2028	No PAR
C57.155	2014	IEEE Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers	12/31/2024	No PAR
Insulation Life		**SC Chair: Sheldon Kennedy** **email: skennedy@niagaratransformer.com** **phone: (716) 896-6500**		
1276	1997	IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Power Transformers	12/31/2018	Sponsor Ballot: Invitation PAR extension submitted
1538	2000	IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Filled Transformers	12/31/2021	No PAR
1538a	2015	IEEE Guide for Determination of Maximum Winding-Temperature Rise in Liquid Immersed Transformers -- Amendment 1	12/31/2025	No PAR
C57.100	2011	IEEE Standard Test Procedure for Thermal Evaluation of Insulation Systems for Liquid-Immersed Distribution and Power Transformers	12/31/2021	NesCom Agenda 19-Oct-2018
C57.119	2018	IEEE Approved Draft Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Ratings	12/31/2028	No PAR
C57.154	2012	IEEE Standard for the Design, Testing, and Application of Liquid-Immersed Distribution, Power, and Regulating Transformers Using High-Temperature Insulation Systems and Operating at Elevated Temperatures	12/31/2022	PAR expires in 2022
C57.91	2011	IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators	12/31/2021	PAR expires in 2021

Standard Number	Year	Title	SASB Expiration	Notes
Instrument Transformers		**SC Chair: Ross McTaggart email: rossdm@ca.trenchgroup.com phone: (416) 751-8570**		
C57.13	2016	IEEE Standard Requirements for Instrument Transformers	12/31/2026	No PAR
C57.13.2	2005	IEEE Standard for Conformance Test Procedure for Instrument Transformers	12/31/2020	PAR expires in 2021
C57.13.5	2009	IEEE Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above	**12/31/2019**	**PAR expires in 2020**
C57.13.6	2005	IEEE Standard for High Accuracy Instrument Transformers	12/31/2020	No PAR
Performance Characteristics		**SC Chair: Ed TeNyenhuis email: ed.g.tenyenhuis@ca.abb.com phone: (519) 837-4691**		
60076-16	2018	IEC/IEEE International Draft Standard - Power Transformers - Part 16: Transformers for Wind Turbine Application	12/31/2028	No PAR
C57.105	1978	IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems	12/31/2018	Sponsor Ballot: Comment Resolution 5 comments to review Par expires in 2019
C57.109	1993	IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration	12/31/2028	No PAR
C57.110	2018	IEEE Approved Draft Recommended Practice for Establishing Liquid-Immersed and Dry-Type Power and Distribution Transformer Capability When Supplying Nonsinusoidal Load Currents	12/31/2028	No PAR
C57.120	2017	IEEE Guide for Loss Evaluation of Distribution and Power Transformers and Reactors	12/31/2027	No PAR
C57.123	2010	IEEE Guide for Transformer Loss Measurement	12/31/2020	PAR expires in 2021
C57.136	2000	IEEE Guide for Sound Level Abatement and Determination for Liquid-Immersed Power Transformers and Shunt Reactors Rated Over 500 kVA	12/31/2018	No PAR will become inactive
C57.142	2010	IEEE Guide to Describe the Occurrence and Mitigation of Switching Transients Induced by Transformers, Switching Device, and System Interaction	12/31/2020	PAR expires in 2021
C57.149	2012	IEEE Guide for the Application and Interpretation of Frequency Response Analysis for Oil-Immersed Transformers	12/31/2022	PAR expires in 2022
C57.158	2017	IEEE Guide for the Application of Tertiary and Stabilizing Windings in Power Transformers	12/31/2027	No PAR
C57.159	2016	IEEE Guide on Transformers for Application in Distributed Photovoltaic (DPV) Power Generation Systems	12/31/2026	No PAR

Standard Number	Year	Title	SASB Expiration	Notes
Performance Characteristics		**SC Chair: Ed TeNyenhuis email: ed.g.tenyenhuis@ca.abb.com phone: (519) 837-4691**		
C57.18.10	1998	IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers	12/31/2019	PAR expires in 2020
C57.21	2008	IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA	12/31/2018	WG Draft Development PAR extension submitted
C57.32	2015	IEEE Standard for Requirements, Terminology, and Test Procedures for Neutral Grounding Devices	12/31/2025	Amendment in progress
Power Transformers		**SC Chair: Bill Griesacker email: bgriesacker@doble.com phone: (617) 393-3074**		
638	2013	IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations	12/31/2023	No PAR
60076-57-1202	2016	IEC/IEEE International Standard Power transformers --Part 57-1202: Liquid immersed phase-shifting transformers	12/31/2026	No PAR
C57.116	2014	IEEE Guide for Transformers Directly Connected to Generators	12/31/2024	No PAR
C57.12.10	2017	IEEE Standard Requirements for Liquid-Immersed Power Transformers	12/31/2027	No PAR
C57.125	2015	IEEE Guide for Failure Investigation, Documentation, Analysis, and Reporting for Power Transformers and Shunt Reactors	12/31/2025	No PAR
C57.131	2012	IEEE Standard Requirements for Tap Changers	12/31/2022	No PAR
C57.135	2011	IEEE Guide for the Application, Specification, and Testing of Phase-Shifting Transformers	12/31/2021	No PAR
C57.140	2017	IEEE Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers	12/31/2027	No PAR
C57.143	2012	IEEE Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components	12/31/2022	PAR expires in 2021
C57.148	2011	IEEE Standard for Control Cabinets for Power Transformers	12/31/2021	PAR expires in 2020
C57.150	2012	IEEE Guide for the Transportation of Transformers and Reactors Rated 10 000 kVA or Higher	12/31/2022	PAR expires in 2021
C57.153	2015	IEEE Guide for Paralleling Regulating Transformers	12/31/2025	No PAR
C57.156	2016	IEEE Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors	12/31/2026	No PAR
C57.157	2015	IEEE Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid--Immersed Transformers	12/31/2025	No PAR
C57.17	2012	IEEE Standard Requirements for Arc Furnace Transformers	12/31/2022	No PAR

Standard Number	Year	Title	SASB Expiration	Notes
Power Transformers		**SC Chair: Bill Griesacker email: bgriesacker@doble.com phone: (617) 393-3074**		
C57.93	2007	IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers	12/31/2018	Sponsor Ballot: Comment Resolution 84 comments to review PAR expires in 2020
Standards		**SC Chair: Jerry Murphy email: jerry.murphy@ieee.org phone: (407) 824-4194**		
C57.12.00	2015	IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers	12/31/2025	PAR expires in 2021
C57.12.70	2011	IEEE Standard for Standard Terminal Markings and Connections for Distribution and Power Transformers	12/31/2021	PAR expires in 2022
C57.12.80	2010	IEEE Standard Terminology for Power and Distribution Transformers	12/31/2020	PAR expires in 2021
C57.12.90	2015	IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers	12/31/2025	PAR expires in 2021
C57.144	2004	IEEE Guide for Metric Conversion of Transformer Standards	12/31/2020	No PAR
C57.152	2013	IEEE Guide for Diagnostic Field Testing of Fluid-Filled Power Transformers, Regulators, and Reactors	12/31/2023	No PAR
Standards		**SC Chair: Jerry Murphy email: jerry.murphy@ieee.org phone: (407) 824-4194**		
C57.163	2015	IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances	12/31/2025	No PAR
Subsurface Transformers & Network Protectors		**SC Chair: Dan Mulkey email: dhmuhlkey@ieee.org phone: (707) 776-7346**		
C57.12.23	2009	IEEE Standard for Submersible Single-Phase Transformers: 167 kVA and Smaller; High Voltage 25 000 V and Below; Low Voltage 600 V and Below	12/31/2019	**RevCom Agenda 04-Dec-2018 PAR expires in 2018**
C57.12.24	2016	IEEE Standard for Submersible, Three-Phase Transformers, 3750 kVA and Smaller: High Voltage, 34 500 GrdY/19 920 Volts and Below; Low Voltage, 600 Volts and Below	12/31/2026	No PAR
C57.12.40	2017	IEEE Standard for Network, Three-Phase Transformers, 2500 kVA and Smaller; High Voltage, 34 500 V and Below; Low Voltage, 600 V and Below; Subway and Vault Types (Liquid Immersed)	12/31/2027	No PAR
C57.12.44	2014	IEEE Standard Requirements for Secondary Network Protectors	12/31/2024	PAR expires in 2019

Appendix A

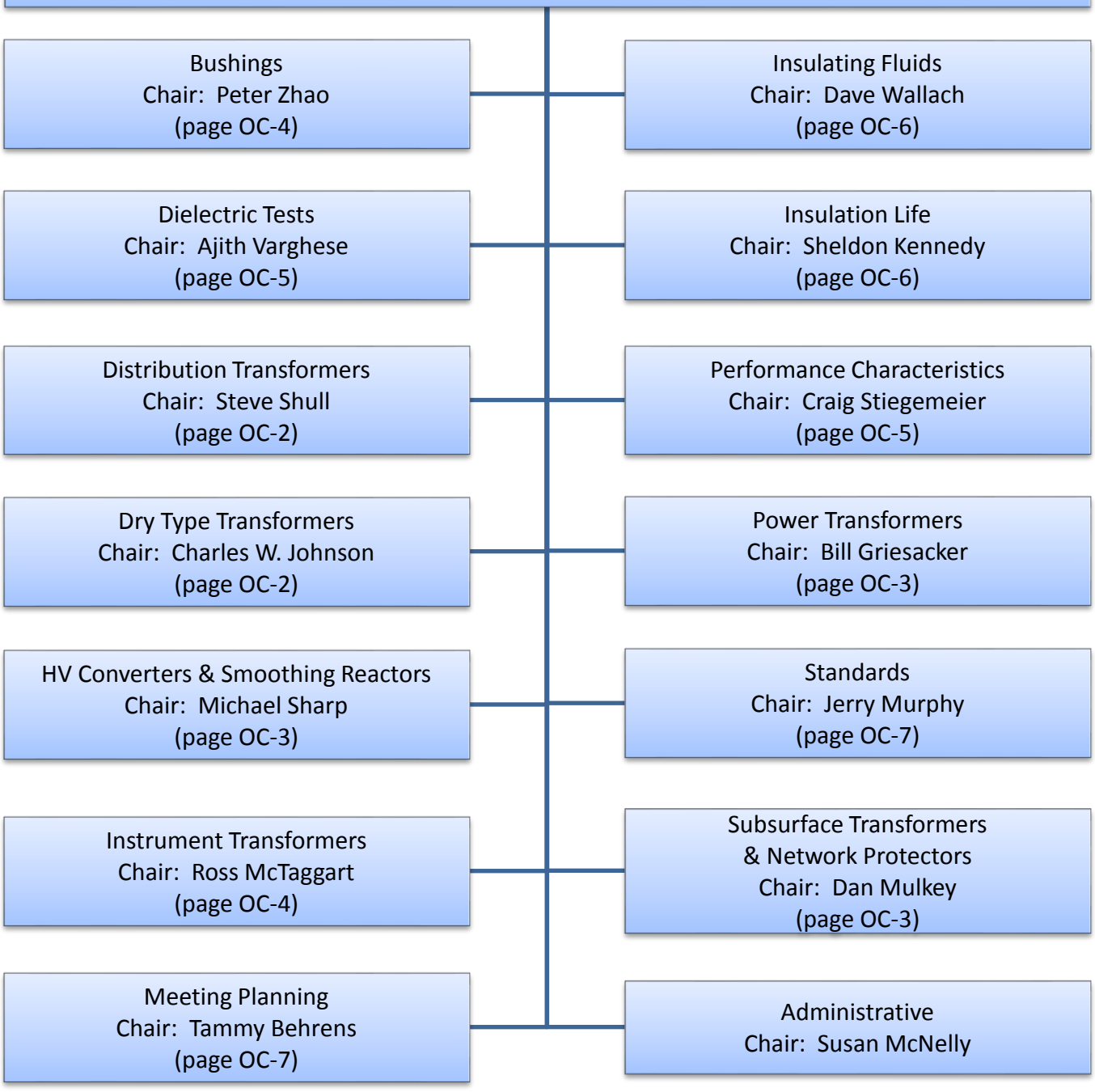
Transformers Committee Organization Chart

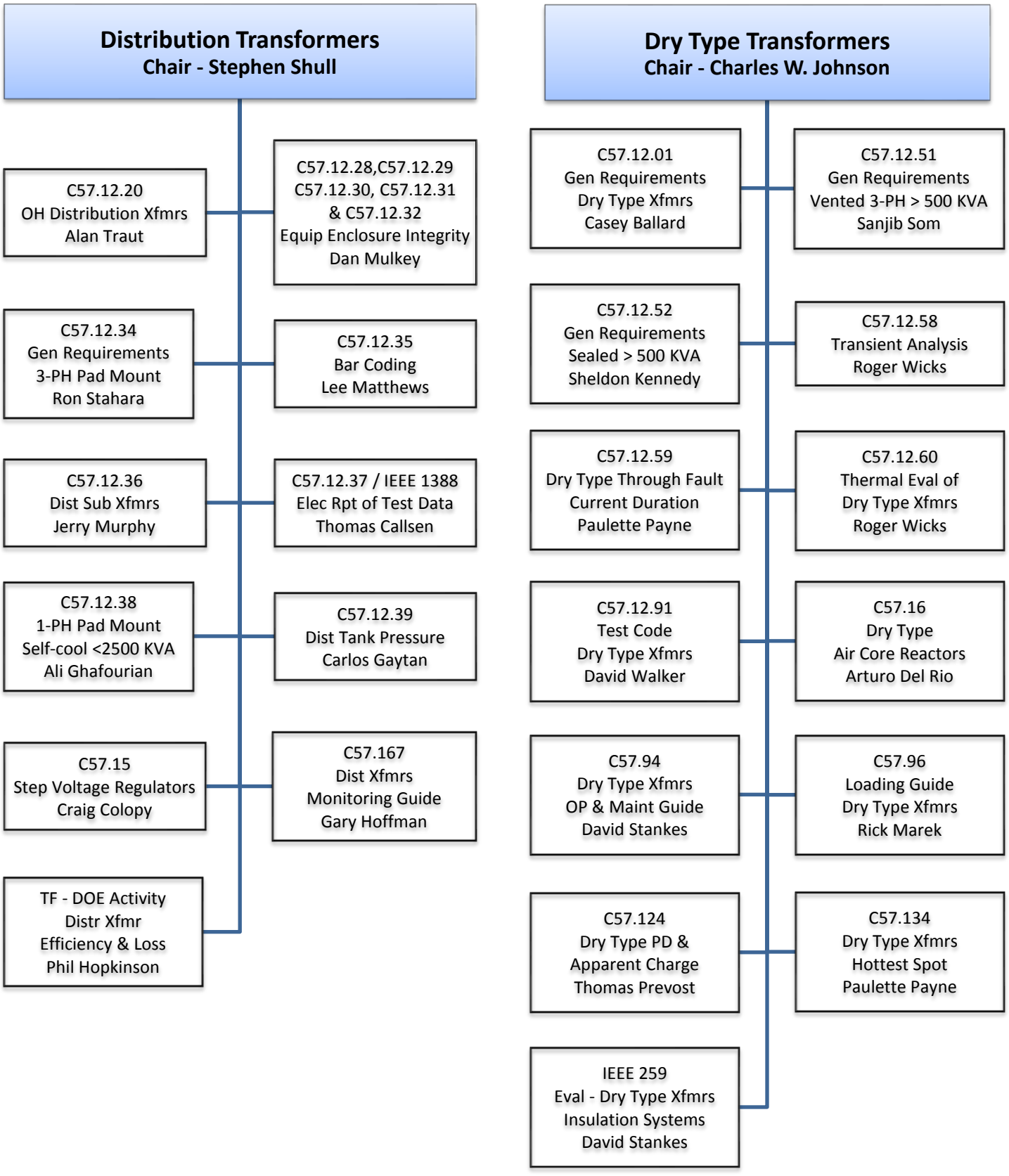
IEEE PES Transformers Committee

Chair: Susan McNelly

Vice-Chair: Bruce Forsyth **Secretary:** Ed teNyenhuis **Treasurer:** Paul Boman

Past Chair: Stephen Antosz **Standards Coordinator:** James Graham




Distribution Transformers
Chair - Stephen Shull
C57.12.20
OH Distribution Xfmrs
Alan Traut
C57.12.28,C57.12.29
C57.12.30, C57.12.31
& C57.12.32
Equip Enclosure Integrity
Dan Mulkey
C57.12.34
Gen Requirements
3-PH Pad Mount
Ron Stahara
C57.12.35
Bar Coding
Lee Matthews
C57.12.36
Dist Sub Xfmrs
Jerry Murphy
C57.12.37 / IEEE 1388
Elec Rpt of Test Data
Thomas Callsen
C57.12.38
1-PH Pad Mount
Self-cool <2500 KVA
Ali Ghafourian
C57.12.39
Dist Tank Pressure
Carlos Gaytan
C57.15
Step Voltage Regulators
Craig Colopy
C57.167
Dist Xfmrs
Monitoring Guide
Gary Hoffman
TF - DOE Activity
Distr Xfmr
Efficiency & Loss
Phil Hopkinson
Dry Type Transformers
Chair - Charles W. Johnson
C57.12.01
Gen Requirements
Dry Type Xfmrs
Casey Ballard
C57.12.51
Gen Requirements
Vented 3-PH > 500 KVA
Sanjib Som
C57.12.52
Gen Requirements
Sealed > 500 KVA
Sheldon Kennedy
C57.12.58
Transient Analysis
Roger Wicks
C57.12.59
Dry Type Through Fault
Current Duration
Paulette Payne
C57.12.60
Thermal Eval of
Dry Type Xfmrs
Roger Wicks
C57.12.91
Test Code
Dry Type Xfmrs
David Walker
C57.16
Dry Type
Air Core Reactors
Arturo Del Rio
C57.94
Dry Type Xfmrs
OP & Maint Guide
David Stankes
C57.96
Loading Guide
Dry Type Xfmrs
Rick Marek
C57.124
Dry Type PD &
Apparent Charge
Thomas Prevost
C57.134
Dry Type Xfmrs
Hottest Spot
Paulette Payne
IEEE 259
Eval - Dry Type Xfmrs
Insulation Systems
David Stankes

HVDC Converter Transformers & Smoothing Reactors
Chair - Michael Sharp

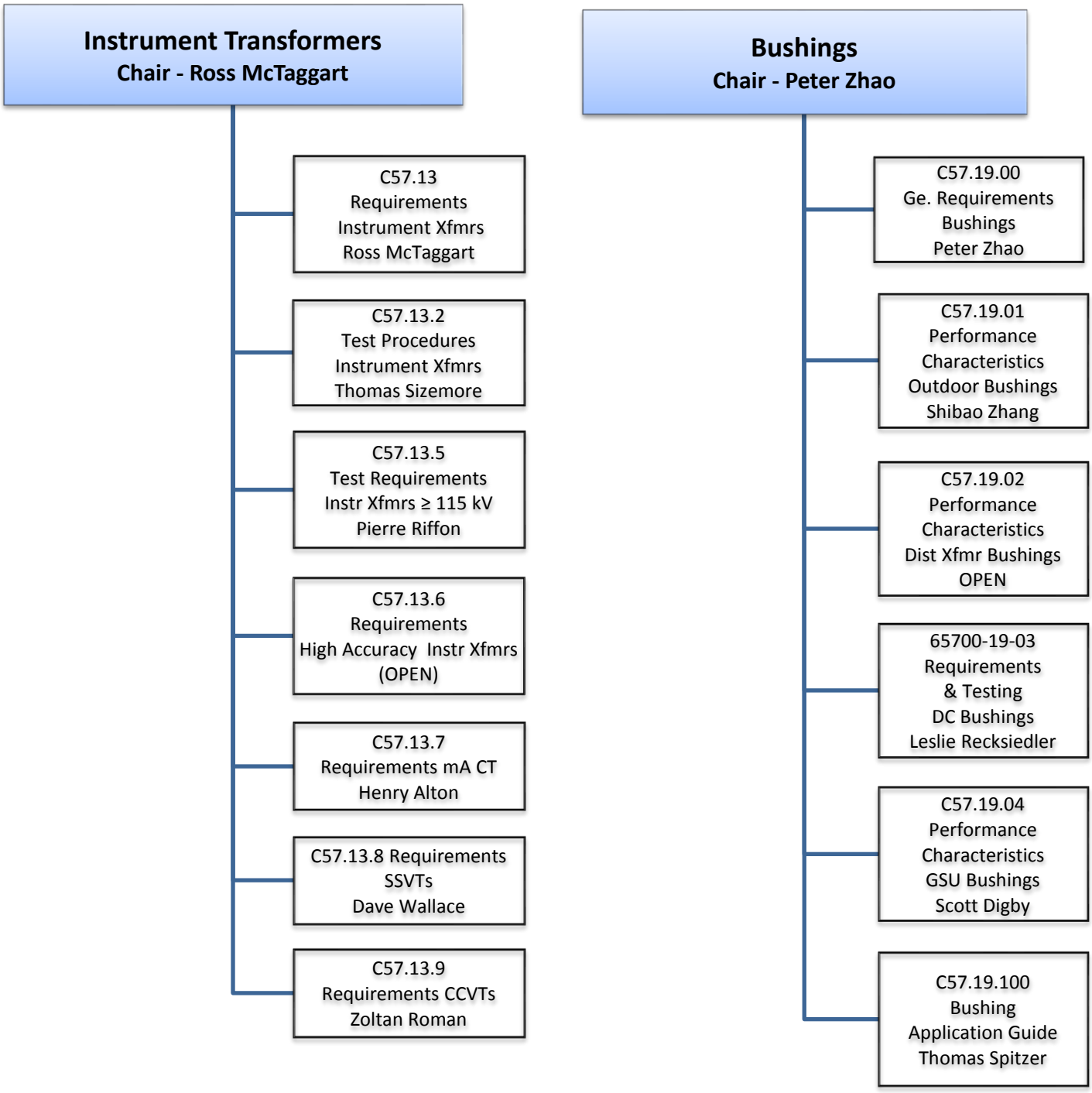
- IEEE 1277 Requirements & Test Code for Smoothing Reactors — Klaus Pointner
- C57.129 Requirements & Test Code for HVDC Converter Xfmrs — Ulf Radbrandt

Subsurface Transformers & Network Protectors
Chair - Dan Mulkey

- C57.12.23 Cont. Revision Submersible 1Ø Xfmrs — Allan Traut
- C57.12.24 Cont Revision Submersible 3Ø Xfmrs >2500 KVA — Giuseppi Termini
- C57.12.40 Sec Network Xfmrs Cont Revision — Brian Klaponski
- C57.12.44 Sec Network Protectors Cont Revision — Mark Faulkner

Power Transformers
Chair - Bill Griesacker

- C57.12.10 Req -Power Xfmrs — Gary Hoffman
- C57.17 Arc Furnace Xfmrs — Robert Ganser
- C57.93 Installation Guide — Mike Lau
- C57.116 Direct Connect GSU — Gary Hoffman
- C57.125 Failure Investigations — Wally Binder
- C57.135 Phase-Shift Xfmrs — Raj Ahuja
- C57.140 Reconditioning Power Xfmrs — Paul Boman
- C57.143 Monitoring Guide — Michael Spurlock
- C57.148 Cont Cabinet Guide — Joe Watson
- C57.150 Transportation Guide — Greg Anderson
- C57.153 Paralleling Guide — Tom Jauch
- C57.156 Tank Rupture Guide — Peter Zhao
- C57.157 Functional Life Tests - Switch Contacts — Phil Hopkinson
- IEEE 638 1E Xfmrs at Nuclear Stations — Craig Swinderman
- 60214-1-57-131 Gen Requirements Tap Changers — Craig Colopy
- 60214-2 Application Guide Tap Changers — Craig Colopy
- 60076-57-1202 Requirements - Phase Shifters — Raj Ahuja

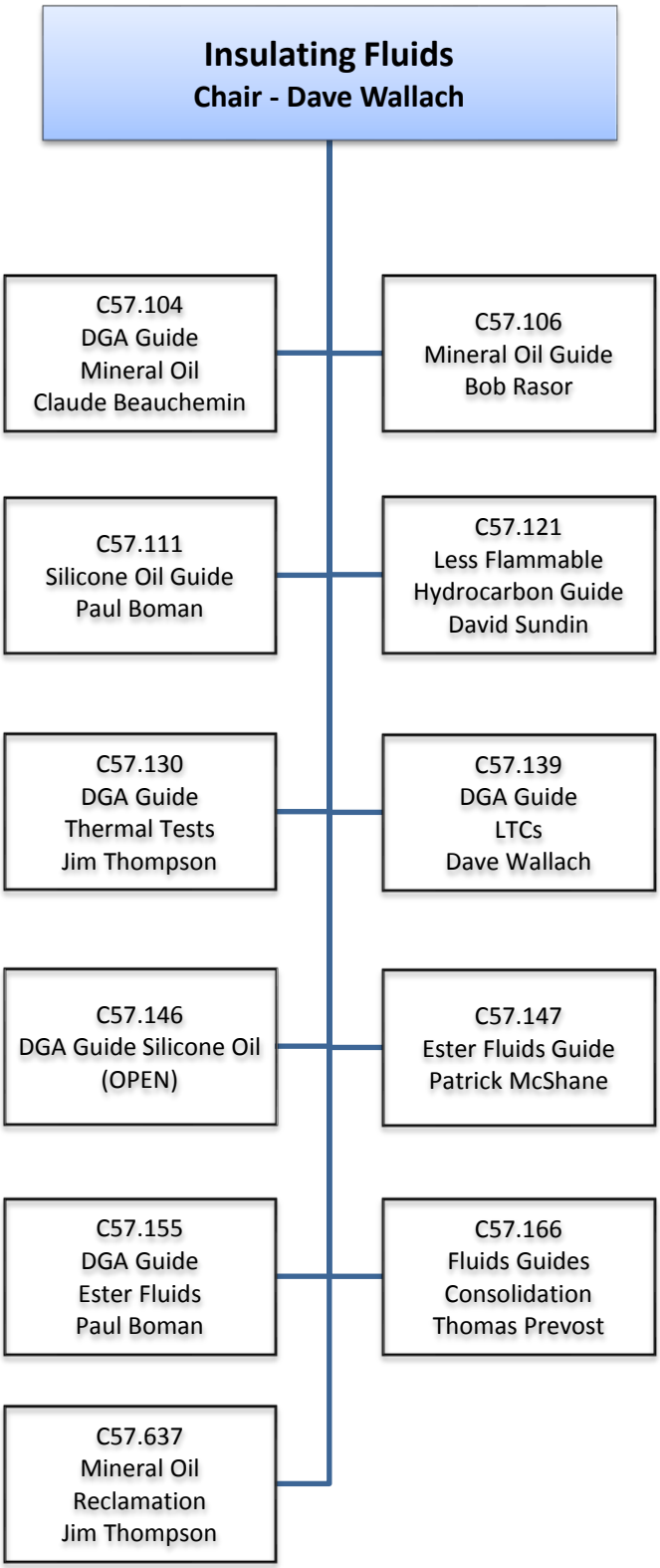

Instrument Transformers
Chair - Ross McTaggart
C57.13
Requirements
Instrument Xfmrs
Ross McTaggart
C57.13.2
Test Procedures
Instrument Xfmrs
Thomas Sizemore
C57.13.5
Test Requirements
Instr Xfmrs ≥ 115 kV
Pierre Riffon
C57.13.6
Requirements
High Accuracy Instr Xfmrs
(OPEN)
C57.13.7
Requirements mA CT
Henry Alton
C57.13.8 Requirements
SSVTs
Dave Wallace
C57.13.9
Requirements CCVTs
Zoltan Roman
Bushings
Chair - Peter Zhao
C57.19.00
Ge. Requirements
Bushings
Peter Zhao
C57.19.01
Performance
Characteristics
Outdoor Bushings
Shibao Zhang
C57.19.02
Performance
Characteristics
Dist Xfmr Bushings
OPEN
65700-19-03
Requirements
& Testing
DC Bushings
Leslie Recksiedler
C57.19.04
Performance
Characteristics
GSU Bushings
Scott Digby
C57.19.100
Bushing
Application Guide
Thomas Spitzer

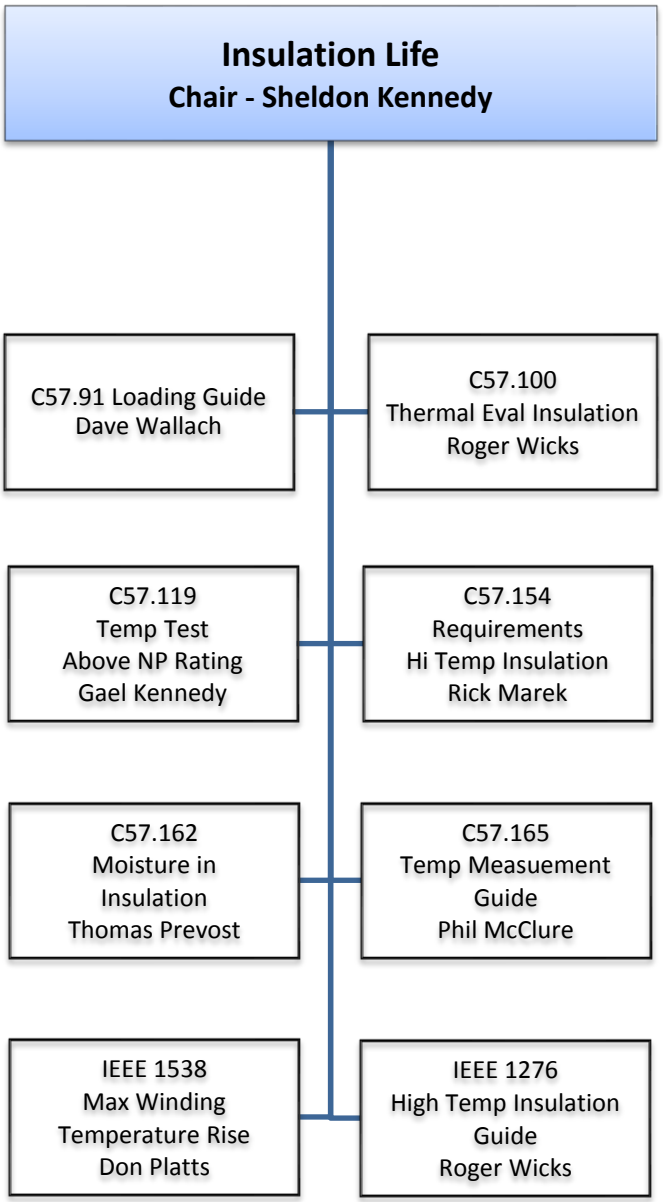
Dielectric Tests
Chair - Ajith Varghese

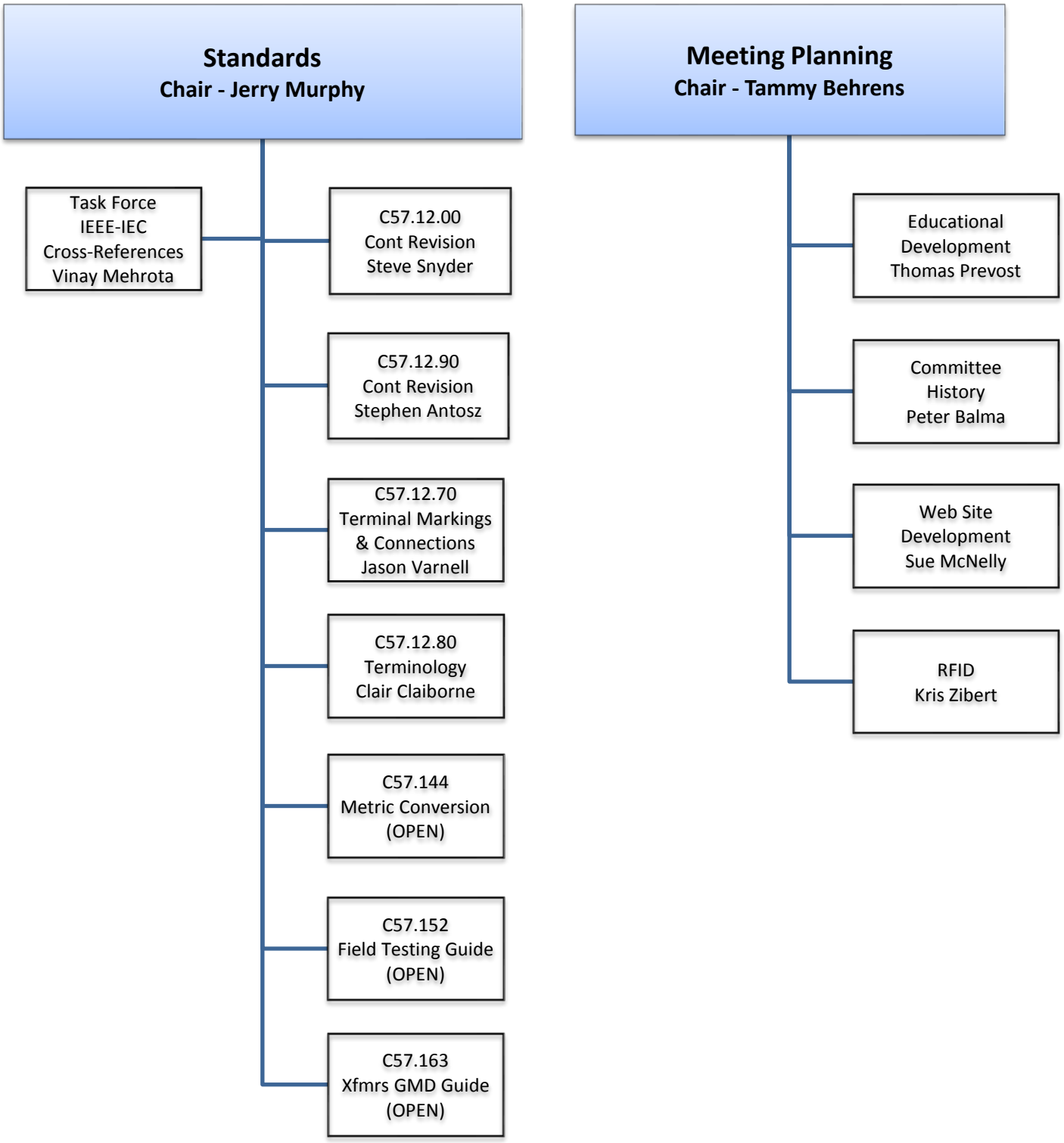
- C57.98 Impulse Tests Guide — Thang Hochanh
- C57.113 PD Measurement — Ali Naderian
- C57.127 Acoustic PD Guide — Detlev Gross
- C57.138 Dist Xfmrs Impulse Test (OPEN)
- C57.160 PD Measurement Bushings & Instr Xfmrs — Thang Hochanh
- C57.161 DFR Test Guide — Ali Naderian
- C57.168 Low Freq Test Guide — Daniel Sauer
- Entity Task Force Freq Domain Spectroscopy - Bushings — Jun Deng
- Task Force Low Freq Tests Cont Revision — Bill Griesacker
- Task Force Impulse Tests Cont Revision — Pierre Riffon

Performance Characteristics
Chair - Craig Stiegemeier

- TF-PCS Revisions C57.12.00 — Tauhid Ansari
- TF-PCS Revisions C57.12.90 — Hakan Sahin
- C57.18.10 Semicon Rectifier fmrs — Sheldon Kennedy
- C57.21 Req & Test Code Reactors >500 KVA — Sanjib Som
- C57.32 Neutral Gnd Devices — Sheldon Kennedy
- C57.32a (Amend) Neutral Gnd Devices — Sergio Panetta
- C57.105 Xfmr Connections Guide — Roger Verdolin
- C57.109 Through Fault Current Duration — Vinay Mehrota
- C57.110 Nonsinusoidal Load Currents — Rick Marek
- C57.120 Loss Evaluation Guide — Roger Verdolin
- C57.123 Xfmr Loss Measurement — Ed teNyenhuis
- C57.133 Short Ckt Testing — Thomas Prevost
- C57.136 Sound Level Abatement — Stephen Antosz
- C57.142 Sw Transients CB/Xfmr — Jim McBride
- C57.149 FRA for Oil Immersed Xfmrs — Charles Sweetser
- C57.158 Tert & Stabilizing Windings — Enrique Betancourt
- C57.159 DPV Grid Xfmrs — Hem Shertukde
- C57.164 Short Ckt Withstand — Sanjay Patel
- 60076-16 Wind Farm Xfmrs — Phil Hopskinson
- Entity Task Force HVDC Neutral Devices — Lijie Ding


Insulating Fluids
Chair - Dave Wallach
C57.104
DGA Guide
Mineral Oil
Claude Beauchemin
C57.106
Mineral Oil Guide
Bob Rasor
C57.111
Silicone Oil Guide
Paul Boman
C57.121
Less Flammable
Hydrocarbon Guide
David Sundin
C57.130
DGA Guide
Thermal Tests
Jim Thompson
C57.139
DGA Guide
LTCs
Dave Wallach
C57.146
DGA Guide Silicone Oil
(OPEN)
C57.147
Ester Fluids Guide
Patrick McShane
C57.155
DGA Guide
Ester Fluids
Paul Boman
C57.166
Fluids Guides
Consolidation
Thomas Prevost
C57.637
Mineral Oil
Reclamation
Jim Thompson


Insulation Life
Chair - Sheldon Kennedy
C57.91 Loading Guide
Dave Wallach
C57.100
Thermal Eval Insulation
Roger Wicks
C57.119
Temp Test
Above NP Rating
Gael Kennedy
C57.154
Requirements
Hi Temp Insulation
Rick Marek
C57.162
Moisture in
Insulation
Thomas Prevost
C57.165
Temp Measuement
Guide
Phil McClure
IEEE 1538
Max Winding
Temperature Rise
Don Platts
IEEE 1276
High Temp Insulation
Guide
Roger Wicks


Standards
Chair - Jerry Murphy
Task Force
IEEE-IEC
Cross-References
Vinay Mehrota
C57.12.00
Cont Revision
Steve Snyder
C57.12.90
Cont Revision
Stephen Antosz
C57.12.70
Terminal Markings
& Connections
Jason Varnell
C57.12.80
Terminology
Clair Claiborne
C57.144
Metric Conversion
(OPEN)
C57.152
Field Testing Guide
(OPEN)
C57.163
Xfmrs GMD Guide
(OPEN)
Meeting Planning
Chair - Tammy Behrens
Educational
Development
Thomas Prevost
Committee
History
Peter Balma
Web Site
Development
Sue McNelly
RFID
Kris Zibert

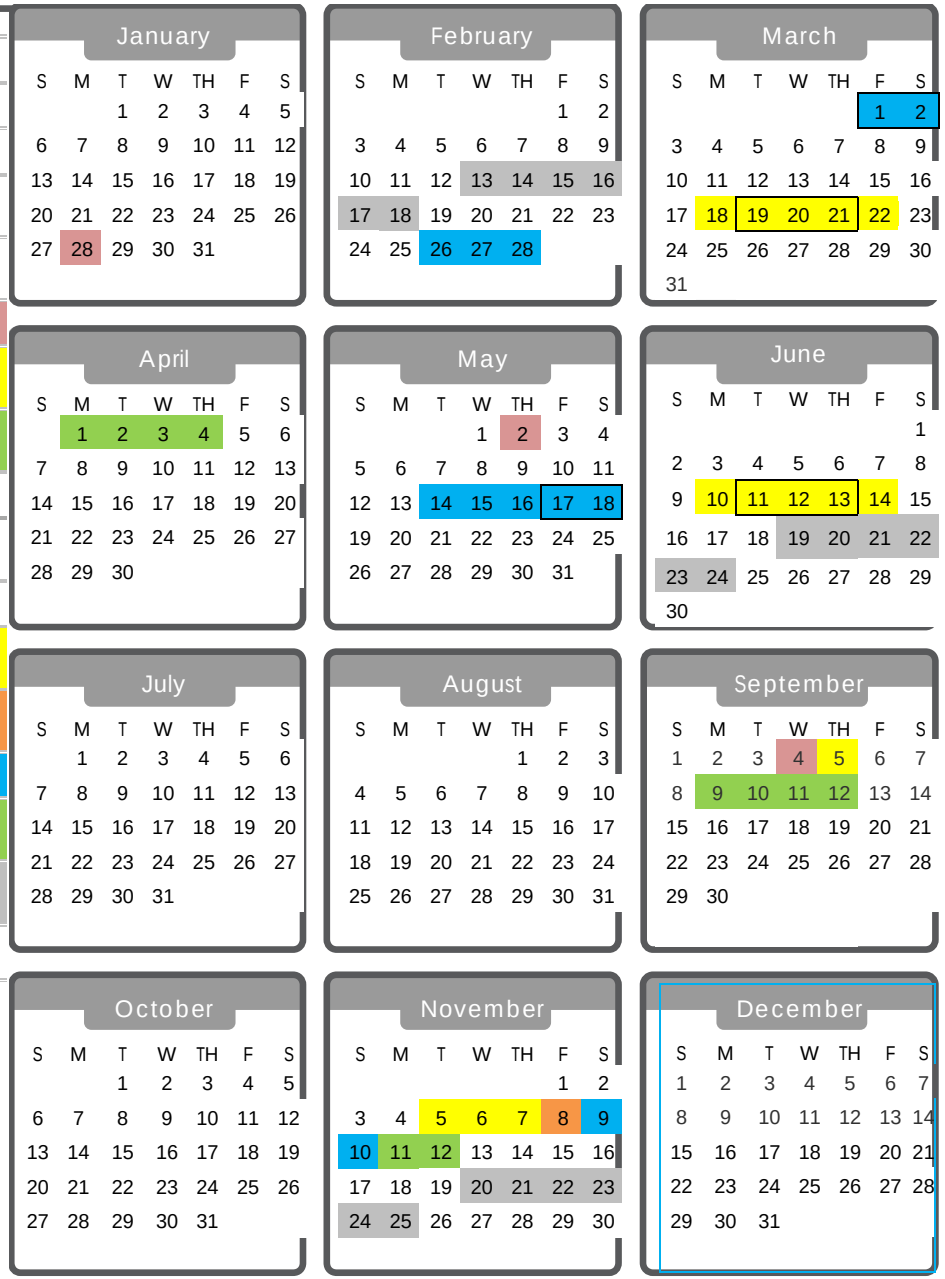
Appendix B

IEEE Standards Association Meeting Schedule

IEEE Standards Association Governance Meetings Schedule

2019

JANUARY	**JULY**
28: NesCom/RevCom teleconferences	
FEBRUARY	**AUGUST**
13-18: IEEE BOD series, Tampa, Florida, USA	
26-28: BOG outreach, Melbourne, Australia	**SEPTEMBER**
MARCH	**04: NesCom/RevCom teleconferences**
01-02: BOG meeting, Melbourne, Australia	**05: SASB teleconference**
19-21: SASB series, Shanghai, PRC (outreach events on 18th and 22nd)	**09-12: CAG meeting/outreach, Austin, Texas, USA**
APRIL	**OCTOBER**
01-04: CAG meeting/outreach, Bengaluru, India	
MAY	**NOVEMBER**
02: NesCom/RevCom teleconferences	**05-07: SASB series, Piscataway, New Jersey, USA**
17-18: BOG meeting, Tallinn, Estonia (outreach events on 14th-16th)	**08: Awards Ceremony, Somerset, New Jersey, USA**
JUNE	**09-10: BOG, Piscataway, New Jersey, USA**
11-13: SASB series, London, UK (outreach events on 10th and 14th)	**11-12: CAG meeting, Piscataway, New Jersey, USA**
19–24: IEEE BOD series, Atlanta, Georgia, USA	**20-25: IEEE BOD series, Boston, Massachusetts, USA**
	DECEMBER



NesCom/RevCom Submittal Deadlines:

18 December 2018
08 February 2019
22 March 2019
03 May 2019
26 July 2019
17 September 2019

08 March 2018

APPENDIX 3

CIGRE Liaison Report

CIGRÉ

International Council on Large Electrical Systems

Liaison Report on SCA2 Transformers for
IEEE Transformers Committee- Fall 2018 Meeting
October 15, 2018
Jacksonville, FL

Prepared by Craig Swinderman

Study Committees

SC A1: Rotating Electrical Machines
SC A2: Transformers
SC A3: High Voltage Equipment
SC B1: Insulated Cables
SC B2: Overhead Lines
SC B3: Substations
SC B4: HVDC and Power Electronics
SC B5: Protection and Automation
SC C1: System Development and Economics
SC C2: System Operation and Control
SC C3: System Environmental Performance
SC C4: System Technical Performance
SC C5: Electricity Markets and Regulation
SC C6: Distribution Systems and Dispersed Generation
SC D1: Materials and Emerging Test Techniques
SC D2: Information Systems and Telecommunication

SC A2 WG Activities

No.	Working Group	Topic	Status
1	A2.43	Bushing Reliability	In process
2	A2.45	Transformer Failure Investigation	In process
3	A2/D1.46	Field Experience with transformer solid insulation	In process
4	D1/A2.47	New Frontiers of DGA Interpretation for Power Transformers and Their Accessories	In process
5	A2.49	Condition Assessment of Power Transformers	In process
6	A2/D1.51	PD Measurements	In process
7	A2/C4.52	HF Transformer and Reactor Models	In process
8	A2.53	FRA Interpretation	In process
9	A2.54	Audible Sound Requirements	In process
10	A2.55	Transformer Life Extension	In process
11	A2.56	Transformer Efficiency	In process
12	A2.57	Effects of DC Bias	In process
13	A2.58	Site Installation and Pre-commissioning of Power Transformers and Shunt Reactors	In process
14	A2.59	On-site assembly, On-site Rebuild, and On-site Testing of Power Transformers	In process

TF and AG activities

- Task Force (TF) Activities
  - Insulation Condition at End of Life: reference paper
- Advisory Group (AG) Activities
  - Green Book A2.6: Transformer Procurement Process
    - Developed for Users of Power Transformers
      - Specification Development
      - Factory Qualification
      - Design Review
      - Transportation
      - Site Installation
    - Publication by 2020

Upcoming New Working Groups

- **A2-60**: Dynamic Thermal Performance of Power Transformers
  - Completion 2023
- **A2-61**: Best Practices for On-Load Tap Changers (OLTC)
  - Completion 2022
- **A2-62**: Analysis of Transformer Reliability
  - Completion 2022
- **A2-63**: Transformer Impulse Testing
  - Completion 2023

If interested in contributing, please contact your appropriate CIGRÉ National Committee Representative.

Possible Future Working Group

- On-site Measurement of Sound Level
  - Installation Recommendations
  - Measurement Guidelines
  - Retrofit Mitigation Techniques
    - DC blocking
    - Sound panels
    - Etc.
  - WG anticipated to start in 2020

Upcoming Events

- CIGRÉ US Committee 2018 Grid of the Future
  - Reston, VA, October 28-31, 2018
- IEC/ CIGRÉ Conference on EHV-UHV AC and DC
  - Hakodate, Japan, April 23-26, 2019
  - Topics: Systems and T-Lines, Design of Equipment, Operational Experience, Testing
  - November 20, 2018 deadline for paper submission
- CIGRÉ A2 Colloquium "Transformer Research and Asset Management
  - Zagreb, Croatia, October 9, 2019
  - Topics: Numerical Modeling, Materials, Components and New Techniques, and Transformer Life Management
  - Paper Abstracts due by April 1, 2019
  - Full Paper submission by September 10, 2019
- A2/B3 Study Committee Colloquium
  - Delhi, India November 2019
- CIGRÉ Session 48
  - Paris, France, August, 2020

THANK YOU!

APPENDIX 4

IEC TC14 Liaison Report

IEC TC14 Power Transformers

Chairman: Christoph Ploetner, DE
Secretary: Mick Maghar, UK

Report to IEEE Transformers Committee Fall meeting Jacksonville, October 2018

General Information TC14

- **Membership**
  - **P - Members: 36**
  - **O - Members: 12**
- **Web page for all details** www.iec.ch/tc14
- **Currently active MTs, PTs, WGs 13**
- **Documents maintained / in development 35**
- **Last plenary meeting Sep 2018 in Glasgow**
- **Next plenary meeting 19-20 Sep 2019 in Paris**
- **Joint meeting TC10/TC14 18 Sep 2019 in Paris**

Recently published

- **IEC 60076-11:2018 Dry-type transformers**
  - Convenor: Michel Sacotte, FR
  - Published August 2018
- **IEC/IEEE 60076-16:2018 Transformers for wind turbine applications**
  - Convener: Tom Breckenridge, UK
  - Published September 2018
- **Report of AHG 1 – Functional requirements of insulating liquids for use in power transformers**
  - Convenor: Kevin Rapp, US
  - Decision to publish the report as IEC TR 60076-XX

Revisions in progress

- **IEC 60076-1 General**
  - Convener: Paul Jarman, UK
  - First meeting held recently
- **IEC 60076-4 Guide to the LI and SI testing**
  - Convener: Thang Hochanh, CA
  - First CD expected 2019
- **IEC 60076-5 Ability to withstand short circuit**
  - Convener: Jean-Christophe Riboud, FR
  - Major revision – Eight meetings held so far.
  - First CD expected in 2019

Revisions in progress

- **IEC 60076-6 Reactors**
  - Convener: Rob Verhoeven, NL
  - First meeting recently held
- **IEC 60076-19 Uncertainties in Loss Measurement**
  - Convener: Anders Bergman, SE
  - Work towards CD2
  - Publication expected in 2020
- **IEC/IEEE 60076-21 Step voltage regulators**
  - Convener: Craig Colopy, US
  - Unanimous positive FDIS vote - publication before year end

Revisions in progress

- **IEC/IEEE 60214-2 Tap-changers application guide**
  - Convener: Axel Kraemer, GER
  - FDIS in final preparation
  - Publication expected 2019

New documents in development

- **IEC 60076-22 Transformer and Reactor Fittings**
  - **-1 Protective devices** Awaiting publication
  - **-2 Radiators** Awaiting publication
  - **-3 Liquid to air coolers** Awaiting publication
  - **-4 Liquid to water coolers** Awaiting publication
  - **-5 Pumps** CD in development
  - **-6 Fans** CD in development
  - **-7 Accessories and fittings** CD in development
  - **-8 Electronic monitoring equipment**. NP to file

New documents in development

- **IEC TS 60076-24 Voltage Regulating Distribution Transformers (VRDT)**
  - Convener: Michel Heinz, GER
  - CD2 to be circulated before year end
- **IEC 60076-25 Neutral Grounding Resistors**
  - Convener: Hakam El Assad, FR
  - Work towards first CD

Upcoming revisions

- **IEC 60076-2 Temperature rise for liquid-filled transformers**
  - Convener: Dejan Susa, NO
  - Call for experts sent out
  - Revision to start with first meeting on 12/13 February 2019 in London

Ad Hoc Group (continuing)

- **Ad Hoc Group 35**
  Functional classification of power transformers
  - Convener: Angelo Baggini, IT
  - Report on classification of power transformer technologies in terms of functionality. Include new technologies (power electronics…)
  - Report on the need to amend the scope and strategic business plan of TC 14

Ad Hoc Group (new)

- **Ad Hoc Group 36**
  Coordination of thermal requirements in existing standards
  - Convener: Rick Marek, US
  - Develop a new structure for future IEC TC14 thermal standards
  - Consider entire material in existing standards
  - Consider latest developments and industry interests (high and low temperature)
  - Decide careful on content that is needed and belongs into standards and what is sufficient to reference to

APPENDIX 5

ASTM D27

ASTM Committee D27
Electrical Insulating and Gases
Liaison Report

Thomas Prevost

IEEE/PES Transformers Committee
October 16, 2018
Jacksonville, Florida

AGENDA

Introduction to ASTM D27

Current Hot Topics

Future Meetings

Committee D27 on Electrical Insulating Liquids and Gases

ASTM Committee D27 on Electrical Insulating Liquids and Gases was formed in 1959. D27 meets twice each year, in November and May, with about 30 members participating in 12 meetings over two days. The Committee, with a membership of approximately 90 members, currently has jurisdiction of over 60 approved standards that are published in the Annual Book of ASTM Standards, Volume 10.03

D27 Committee Scope

The promotion of knowledge pertaining to electrical insulating liquids and gases, whether of synthetic or natural origin, and the recommendation of standards pertinent to these materials. The principal materials included in this scope are oils of petroleum origin, synthetic liquids, halogenated and other gases, when used, singularly or as combinations, as electrical insulation or as an environment for electrical insulation.

Standards peculiar to solid insulating materials and varnishes and the development of standards pertaining to the nonelectrical uses of liquid and gaseous materials are excluded from the scope of Committee D27. Development in these fields incidental to the normal work of Committee D27 will be coordinated with the appropriate technical committees of the Society.

Committee Officers

Chairman: Janet V. Lloyd
Vice-chairman: Lance R. Lewand
Secretary: Edward W. Casserly
Staff manager: Kelly Paul
Admin assistant: Marianne McKeever
Editor: Christine Leinweber

Subcommittees

D27.01 Mineral
D27.02 Gases and Non-Mineral Oil Liquids
D27.03 Analytical Tests
D27.05 Electrical Test
D27.06 Chemical Test
D27.07 Physical Test
D27.15 Planning Resource and Development
D27.90 Executive
D27.91 I.E.C. TC 10 and Advisory
D27.95 Awards, Special Events, and Bylaws.

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ASTM D27 Hot Topics

Subcommittee Reports

D27.01 - Mineral Oils, Jimmy Rasco:

- The new standard specification for rerefined mineral insulating oil (WK31231) received six (6) negative votes and three (3) comments.
- The revision of D117 "Standard Guide for Sampling, Test Methods, and Specifications for Electrical Insulating Oils of Petroleum Origin" (WK51721) received two (2) negative and six (6) comments.

D27.02 - Gases and Non-Mineral Oil Liquids, Denis Lafrance:

- The new standard specification for synthetic esters (WK46195) received one (1) negative and eleven (11) comments.

8

ASTM D27 Hot Topics

D27.03 - Analytical Tests, Claude Beauchemin:

- The new standard method for the determination of methanol and ethanol (WK30948) received three (3) negatives and five (5) comments.

D27.05 - Electrical Tests, Sandra Smith:
There were no closed ballot actions since the last meeting.

D27.06 - Chemical Tests, Lance Lewand:
There were no closed ballot actions since the last meeting.

D27.07 - Physical Tests, William Hand:
There were no closed ballot actions since the last meeting.

D27.95 - Awards, Special Events, Bylaws, Clair Claiborne:

- There was a reception Monday evening for the presentation of the Award of Merit to Kevin Rapp.

9

ASTM D27 Hot Topics

D27.15 - Planning, Resources and Development, Kevin Rapp:

- On Monday, Professor Massimo Pompili of the University of Rome conducted a symposium on "Partial Discharge Measurements in Dielectric Liquids".
- The term Unused will be balloted in a revision of D2864. IEEE currently uses New since there is not an official definition of Unused.
- There will be a special meeting on partial discharge at the Nov, 2018 meeting in Washington, DC. It will be held the afternoon of Sunday, Nov 4.
- There will be a symposium at the Nov, 2018 meeting in Washington, DC on water measurements by Karl Fischer (D1533) and Evaporative Stripping by Tom Prevost.

D27.91 - IEC TC 10 Advisory, Kevin Rapp:
Kevin Rapp presented the IEC TC 10 Advisory report.

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Future Meetings

Nov 4 – 6, 2018; Washington Hilton; Washington, DC

May 12 – 14, 2019; Sheraton Denver Downtown Hotel; Denver, CO

Nov 3 – 5, 2019; Marriott Marquis; Houston, TX

APPENDIX 6

Meeting Planning

SC Meetings Planning
Fall 2018 Meeting
Jacksonville, FL

Meeting Attendance

	2016 Fall Vancouver	2017 Spring New Orleans	2017 Fall Louisville	2018 Spring Pittsburgh	2018 Fall Jacksonville
Attendees	**578** (580 – 2)	**601** (604 – 3)	**595** (599 – 4)	**626** (635 – 9)	**589** (596 – 7)
Spouses/ Companions	**122** (122 – 0)	**87** (89 – 2)	**64** (65 – 1)	**73** (73 – 0)	**74** (75 – 1)

Meeting Attendance

Attendees: 589
Spouses/Companions/Guests: 74

Sunday Event: 439 (vs. 424 CAPACITY in Pittsburgh for PAID BANQUET; 423 in Louisville, 489 in New Orleans REGISTERED FOR FREE RECEPTION)

Mon Standards Lunch: 225 signed-up (vs. 234/230/222 in PIT/LOU/NOLA)
Tues Awards Lunch: 245 signed-up (vs. 271/257/252 in PIT/LOU/NOLA)

Early Bird at River City Brewing Company: PLEASE DO NOT REGISTER IF YOU AREN'T GOING TO SHOW UP FOR PAY ON OWN EVENTS!

Spouse/Companion Tours
- Monday, Fernandina: 49 CAPACITY (vs. 50/45/59 in PIT/LOU/NOLA)
- Tuesday, St. Augustine: 52 CAPACITY (vs. 37/43/52 in PIT/LOU/NOLA)

Meeting Feedback
DISCUSSION

Considerations for Future Meeting Sites

- hosts
- consideration of # of attendees
- availability of technical tours and activities
- walking distance restaurants
- international airport

Future Meetings

SPRING 2019 — March 24-28
Anaheim, California USA
Hilton Anaheim – starting at $169
*** HOTEL RESERVATIONS ACCEPTED STARTING TODAY, 10/18/18***

FALL 2019 — October 27-31
Columbus, Ohio USA
Hyatt Regency Columbus

SUGGESTIONS: Kansas City, Denver, Milwaukee, St. Louis, Miami, Quebec City

7

Meetings Subcommittee Updates

- Presentations & Tutorials: Tom Prevost
- Break Sponsor: Ed Smith
- Website: Sue McNelly
- Mobile App: David Wallach
- RFID: Kris Zibert and Dan Weyer NEW VOLUNTEER
- Meeting Schedule: Jerry Murphy NEW VOLUNTEER

- Registration Desk
  - Seaira Ford
  - Jennifer Quandel

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Meetings Subcommittee

- Presentations & Tutorials: Tom Prevost
- Break Sponsor: Ed Smith
- Historian: Peter Balma
- Website: Sue McNelly
- Mobile App: David Wallach
- RFID: Kris Zibert and Dan Weyer NEW VOLUNTEER
- Meeting Schedule: Jerry Murphy NEW VOLUNTEER

- Registration Desk
  - Seaira Ford
  - Jennifer Quandel

9

Volunteer Opportunities

10

BIG THANKS TO SAMUEL SHARPLESS WITH RIMKUS CONSULTING GROUP FOR STORING OUR BOXES BETWEEN PITTSBURGH & JACKSONVILLE MEETINGS!

AND TO SOUTHERN CALIFORNIA EDISON FOR HELPING US OUT BETWEEN JACKSONVILLE & ANAHEIM MEETINGS!

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- Vice chair for subcommittee
- Set up projectors in all meeting rooms before the first meeting of the week and check every morning for continued operation and remove after Tuesday/Wednesday meetings — need at least 2 people to work together on Monday, Tuesday and Wednesday

  NOTE: The hotel will have all the cords run, so all that needs to be done is get the projectors into the meeting rooms before the start of the day's meetings, plug them in and turn them on to verify correct placement on the projector carts; in the evening, just unplug them (you can leave the power cords in the rooms) and bring them back to the storage room for safe keeping.
- At the beginning of each day, remove the prior day's schedule so the current day's schedule is on top on the sign in front of each meeting room; verify each room's schedule against the printed schedule/Guidebook — need one person for Monday through Wednesday
- Daily meeting room review (water stations replenished, chairs placed properly, tables wiped down, dirty dishes/glasses removed at breaks, etc.); work with the hotel to make sure these things are in order at the beginning of every day and throughout the day, as needed — need one point person for Monday through Wednesday
- Help with registration during peak times (Sunday PM and Monday AM)— need 2 people
- Be available throughout the meeting to answer technical questions about the Committee, i.e. how to become a CM, how to become an official member of a WG/TF, etc.
- TASK FORCE: I would like to see a task force formed to help with finding technical tour and other activity opportunities in the cities in which we choose to have our meetings.

  Even with hosted meetings, this group can work with the host to locate other venues that may be appropriate and add value to our meetings (starting with Jacksonville).

12

New web password for subcommittee private directory (transformer/subcommittee/private folder) – *effective, Monday 10/22*:

pW4TCwba($

user name (as always): xfmrcom


13
As you're leaving…
DROP YOUR PLASTIC
NAME BADGE HOLDER
AND CLIP IN BOXES
AROUND HOTEL
Thank you and travel home safely!
IEEE PES
Power & Energy Society
Appendix 6
IEEE PES
100
YEARS
TRANSFORMERS COMMITTEE

APPENDIX 7

IEEE Staff Update Presentation

IEEE STANDARDS ASSOCIATION IEEE

IEEE Standards Association

PES Transformers Meeting
Administrative Subcommittee
Oct.14th, 2018
Malia Zaman
M.Zaman@ieee.org

Agenda

- SA Updates
  - P&Ps
  - Asia PARs
  - PAR status
- ISO/IEC Adoptions
- IEEE/IEC Dual Logo Status
- GDPR Update

IEEE-SA Updates

- Reminder that PE/Transformer Sponsor Policies : Expires in 2019 and a new WG policies will also need to be updated.
- **Asia Based PARS**:
  - **PC57.12.200- Entity PAR:** PE/TR/PE/TR/Dielectric-WGC57.12.200 – Dr. Jung Deng
  - Guide for the Frequency Domain Spectroscopy Measurement of Transformer Bushings - PAR was Approved Sept 27th, 2018
  - **PC57.32.10 – Entity PAR:** PE/TR/PerfCharac-WGC57.32.10
  - Guide for the Selection of Neutral-Grounding Devices for HVDC Converter Transformers Pending - NesCom Agenda 19-Oct-2018
  - Entity WG policies will be needed to be approved prior to their kick off meeting.

IEEE-SA Updates (Cont'd)

- Expiring PARS:
  - **2018** - 6 PARS that are expiring but all have PAR extensions
    - 2 PARs on the RevCom Agenda (1 in Oct, 1 in Dec)
    - 3 are in Sponsor Ballot Stage (Including Invitation)
    - 1 is still in WG development stage
  - **2019** - 8 PARs expiring,
    - 3 are on in Sponsor ballot stage,
    - 5 at Draft Dev. Stage,
    - 7 in WG Development stage
- Expiring Standards in 2018
  - 7 Stds. will become inactive , 1 on RevCom, one nearly done
    - 3 in comment resolution stage
    - 2 WG develop stage
- Expiring Standards in 2019
  - 7 Stds. Expiring,
    - IEEE 57.111 and IEEE 57.121 , will be administratively allowed to become inactive but incorporated into P57.166

IEEE / IEC Dual Logo Update (Active Projects)

- This report is an update on the activities taking place under the IEC/IEEE Dual Logo Agreement

IEEE / IEC Update – Transformers Committee

- ***IEC Adoption of IEEE Transformer Committee Standards under the IEC / IEEE Dual Logo Agreement***
- IEEE C57.15™-2009 (IEC 60076-16:2011-12) – Guide for the Application, Specification and Testing of Phase-Shifting Transformers
- IEEE C57.135™-2011 (IEC 62032 Ed.2:2012-06) – Guide for the Application, Specification and Testing of Phase-Shifting Transformers

Maintenance of IEEE Transformer Committee Standards adopted under the IEC / IEEE Dual Logo Agreement

- IEEE PC57.15/IEC 60076-21, Guide for the Application, Specification and Testing of Phase-Shifting Transformers
- Status – IEEE has obtained SASB approval. IEC FDIS is complete. Publication is expected within four months.

IEEE / IEC Dual Logo Update (Active Projects)

Joint Development of standards with IEC

Published Standards

- IEC/IEEE 65700-19-03:2014, Standard Requirements, Terminology, and Test Code for Bushings for DC Applications Rated 110 kV BIL and Above
- IEC/IEEE 60076-57-1202:2016, Standard Requirements for Liquid Immersed Phase-Shifting Transformers
- IEC/IEEE 60076-57-129:2017, Converter Transformers for HVDC Applications
- IEC/IEEE 60076-16-2018, Standard Requirements for Wind Turbine Generator Transformers

Standards Under Development

- IEC/IEEE 60214-2, Tap-Changers - Part 2: Application Guide
- Status – IEEE/IEC are coordinating the final approval processes. An extension will be submitted by IEEE as IEC has not issued the FDIS yet.
- IEC/IEEE P60214-1-57-131, Standard Requirements for Tap Changers
- Status – PAR expires 2020 and the Joint Revision is under development

* - Open for Discussion

GDPR Update

- The General Data Protection Regulation (GDPR) (Regulation EU2016/679) is a regulation by which the European Parliament, the Council of the European Union, and the European Commission intends to strengthen and unify data protection for all EU citizens and individuals within the European Union (EU).
- The GDPR's primary aim is to give control back to citizens and residents over their personal data. Because of its extraterritorial aspects, international businesses will be impacted by the regulation.
- Gone into effect on May 25, 2018
- The GDPR applies to organizations established in the EU and to organizations, whether or not established in the EU, that process the personal data of EU individuals.
  - **IEEE meets these qualifications and is subject to the GDPR.**
  - ❑ PES is handling the 123 Signup incorporations, so they have ore information about the GDPR requirements.

*Additional information will be provided at the Standards Luncheon on Monday

- Questions?
- Contact Information

Malia Zaman
Senior Program Manager
M.Zaman@ieee.org
732-850-6608

IEEE-SA Updates (Cont'd)

Recordings of the proceedings of standards development meetings

- IEEE-SA applies restrictions **on recording the proceedings of IEEE standards development meetings**. Restrictions include, but are not limited to, the usage of audio recording, video recording, and photography by participants or observers.
- An officer of the Working Group or one of its subgroups, unless prohibited by the P & P of the Sponsor or Working Group, is permitted to record, via either audio or slideshow recording only, the proceedings of an IEEE standards development meeting for which he or she is responsible. Recording of the proceedings by any other participant or observer, in part or in whole, via any means, is prohibited.
- The Working Group or subgroup officer shall use the recording exclusively for the purpose of generating minutes. The officer shall not copy or further distribute the recording. Once the meeting minutes have been prepared, the officer shall delete the recording.
- Any IEEE standards development meeting may be recorded for preparation of the meeting minutes as described above. If recording is expected to occur these apply:
  - The **intent to record for preparation** of the **meeting minutes** shall be noted on the distributed meeting agenda.
  - **At the beginning of the meeting, the Chair or designee shall announce the intent to record the meeting** and shall notify participants that remaining in the meeting is an agreement to be recorded.
  - The **fact of the announcement to record** the meeting shall be included in the meeting minutes.

IEEE / IEC Adoptions

- IEEE-SA will no longer adopt ISO or IEC Standards, effective immediately.
- ANSI recently notified IEEE of a change to the ANSI/IEEE license agreement for the sale of National adoptions of ISO and IEC Standards (NAIS). This change is mandating that an adopted standard be labeled as a "U.S. national" standard and must include a U.S. national forward and national branding on each page. In addition, these adopted standards can only be actively marketed/sold in the U.S. This change to the ANSI/IEEE license agreement is inconsistent with IEEE-SA's position as a developer of global standards.
- IEEE-SA along with ISO and IEC are still committed to mutual collaboration. The joint development/dual logo agreements with ISO and IEC remain in place. ISO or IEC can still adopt an IEEE standard
- ISO/IEC Standards can still be used as Normative References in IEEE-SA Standard as this change does not affect the use of ISO and IEC standards as normative references.
- Options available to Working Groups?
  - Working groups are encouraged to normatively reference ISO and IEC standards or to jointly develop standards when appropriate.

ANNEX A Bushings Subcommittee

October 17, 2018
Jacksonville, Florida, USA

Chair: Peter Zhao
Secretary: Eric Weatherbee

A.1 Opening of the Meeting

A.1.1 Introductions

The Chair opened the meeting but declared we would forgo group introductions to allow more time for discussions.

A.1.2 Attendance

Membership count was taken with the following results: 41 of 68 members were present with 73 guests for a total of **114 attendees**. There were 11 new membership requests. There was a quorum.

A.1.3 New Members

Six new members were introduced to the SC and added to the roster. The new members were Mr. Arup Chakraborty, Mr. Anthony Franchitti, Mr. Thang Hochanh, Mr. Stacey Kessler, Mr. Arnaud Martig, Mr. David Stockton.

A.1.4 Meeting Minutes Approval

The Chair asked for a motion to approve the S18 minutes which are hosted on the IEEE Transformer website. Mr. Matthew Weisenee made a motion to approve which was seconded by Mr. Dave Geibel and passed with no objections.

A.1.5 Chairman's Remarks

The Chair asked that everyone verify that their AMS information is current. It was also request that WG and TF Chair be diligent in updating the website and providing their minutes in a timely fashion. The Chair presented the Standards Status Report for bushings, see Appendix A.

A.2 Working Group and Taskforce reports

A.2.1 PC57.19.00-2004 – Peter Zhao, Chair; Eric Weatherbee, Secretary

See complete WG minutes in Appendix B of this report.

A.2.2 C57.19.100-2012 – Tommy Spitzer, Chair; Jeff Benach, Secretary

. See complete WG minutes in Appendix C of this report.

A.2.3 WG PC57.19.01-2000 – Dr. Shibao Zhang, Chair; David Wallach, Secretary

No meeting held as the latest revision was published July 2018.

A.2.4 WG PC57.19.02 Distribution Transformer Bushings – Ed Smith, Chair; Steven Shull, Vice Chair

See complete minutes in Appendix D of this report.

A.2.5 WG PC57.19.04 – Scott Digby, Chair; JD Brafa, Vice Chair; Rich vonGemmingen, Secretary

No meeting was held as the document was published June 2018.

A.2.6 IEC/IEEE 65700.19.03 – Les Recksiedler (IEEE) and John Graham (IEC, retired), Co-Chairs

The first dual logo standard was approved June of 2014, as such, no meeting was held.

A.2.7 TF Bushing Overload – Matthew Weisensee, Chair; Alwyn VanderWalt, Secretary

The TF Chair reviewed the responses to survey that had been received from Transformer and Bushing OEMs. See complete minutes in Appendix E of this report.

A.3 External Liaison Reports

A.3.1 IEC Bushing Standards Activity – Bruno Mansuy, IEEE/IEC Liaison

Mr. Mansuy reported that the IEC Bushing Standard revision passed last year, 60137-2017. He noted that dry impulse lightening test for bushings rated 350BIL and above was added as a routine test requirement for bushing OEMs. Secondly, he noted that there currently is a survey underway regarding standardizing the inboard end of bushings. The Bushing SubCom Chair asked if they could use 19.01 as a starting point for dimensions. Mr. Mansuy stated that it will be extremely difficult task as IEC is a dimensionless international standard and therefore each country has their own dimensional requirements.

A.3.2 IEEE 693 – Eric Weatherbee, IEEE Liaison

Mr. Weatherbee informed the SubCom that Michael Riley of Bonneville Power Administration is the new Chair for 693. Former Chair Eric Fujisaki retired from PG&E 1.5 years ago and decided to step down. The document was submitted for approval to RevCom at their 10/15/18 meeting. Mr. Weatherbee informed the SubCom of ballot process history. The document opened for ballot 06/2016, recirculation passed 10/2017 with 81% approval. The document went through 6 circulations during the ballot process.

A.3.3 WG PC57.160 Guide for PD Meas. in Bushings and Inst. Trans. – Thang Hochanh, Chair

No meeting was held due to the status of the document. The guide is currently in process of going to Ballot.

A.4 Unfinished Business

A.4.1 Dielectric Frequency Response (DFR) Test for Bushings

The Chair asked Ms. McNelly if there was any new information she could share with SubCom regarding the creation of this new document. Ms. McNelly stated that a small room will be scheduled for an invite only oversight TF. She stated that any interested individuals should contact the Bushing SubCom Chair.

Following the S18 meeting the following people had contacted the Chair to participate in this new TF: Sanket Bolar, Mario Locarno, Deigo Robalino, Wesley Schrom, Charles Sweetser, Eric Weatherbee, Shibao Zhang, and Peter Zhao

A.5 New Business

A.5.1 Dr. Zhang, volunteered to be liaison to C57.91, Transformer Loading Guide

Dr. Zhang informed the SubCom that he attended the WG meeting for C57.91 and informed them that Annex B needs to be removed or updated as it is no longer part of 19.100 Application Guide. He informed the WG for C57.91 that there is a TF assigned from the Bushing SC to investigate what the

proper course of action should be regarding bushing overload. Dr. Zhang stated he will work as liaison to the WG to keep them updated as new information becomes available.

A.5.2 Mr. Joe Foldi, concerns with the venting of bushings

Mr. Foldi informed the SC that he is not comfortable with the allowance for Transformer OEMs to vent bushings during factory testing to alleviate PD by the Bushing OEMs. Mr. Foldi has brought his concerns up over the last several days in various meetings and most recently he was informed that PD is not an issue with all designs and therefore, he requests that the bushing manufacturers reconsider their stance on venting and instead conquer the issue through design changes.

Dr. Zhang stated that the PD issue is matter of physics with OIP bushing and his company has manufactured OIP bushings for 70 years and have always handled the issue the same way. Dr. Zhang stated that the taking of DGA samples is allowed and that also breaks the bushing seal. If the venting is performed in accordance to each manufacturers instruction there should be no issue. Dr. Zhang stated that a study group which consisted of users, transformer OEMs and bushing OEMs discussed the issue and concluded that adding the statement that venting can be performed per the manufacturer's instructions to 12.90 was the best solution.

Mr. Bill Griesacker stated he is the Chair for the TF For Continuous Revision to Low Frequency Dielectric Tests which formed the Study Group to investigate PD in OIP bushings during Transformer OEM testing. It was originally brought up in the Bushing SC meetings and passed to DiTest SC which assigned the task to Mr. Griesackers TF. The Study Group submitted a statement for inclusion into 12.90 and his TF approved it for submission to the DiTest SC for review.

The Bushing SC Chair asked Dr. Zhang if he could provide an Annex for addition into 19.100 Application Guide. Dr. Zhang deferred the request to Mr. Dave Geibel, as Mr. Geibel was the lead for the Study Group. Mr. Geibel accepted the task as requested.

Mr. Geibel will also keep the Bushing SC updated with the progress.

See Annex F for proposed statement that was to be submitted to the DiTest SC, however this was not displayed during the Bushing SC and was included as reference only.

A.5.3 Transformer Bushing Reliability

The Chair asked if anyone had been WG member for Cigre A2.43 Transformer Bushing Reliability. Mr. Dave Geibel stated that he had been a member. The Chair asked if Mr. Geibel could provide a summary of highlights for the SC. Mr. Geibel stated that the document has been published and is very large and therefore he would not be able to provide a summary but he recommends reading the document as it is interesting.

A.6 Other

A.7 Adjournment

Bushing Standards Status F18 (unoffical-reference only)					
SubCommittee Chair - Peter Zhao, peter.zhao@HydroOne.com					
Standard **Project**	**Title**	**WG Chair**	**Pub Year** **Rev. Due Date**	**PAR Issue** **Par Expiration**	**Comments**
PC57.19.00	IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings	P. Zhao	**2004** 12/2020	**2018** 12/2022	WG Draft Development
C57.19.01	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings	S. Zhang	**2017** 12/2027		IEEE Std C57.19.01-2017 (12 July 2018)
PC57.19.02	Standard for the Design and Performance Requirements of Bushings Applied to Liquid Immersed Distribution Transformers	Ed Smith	New	**2016** 12/2020	WG Draft Development
65700-19-03	IEC/IEEE International Standard -- Bushings for DC application	L. Rechsiedler	**2014** 12/2024		
C57.19.04	Standard Performance Characteristics and Dimensions for High Current Power Transformer Bushings with Rated Continuous Current in Excess of 5000 A in Bus Enclosures	S. Digby	**2018** 12/2028		IEEE Std C57.19.04-2018 (6 June 18)
C57.19.100	IEEE Guide for Application of Power Apparatus Bushings	T. Spitzer	**2012** 12/2022		Revision discussion meetings, work in progress, PAR to be submitted

PC57.19.00 - WG for the Revision of IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings

11:00 AM to 12:15 PM, Monday October 15, 2018
Hyatt Regency Hotel, Jacksonville, Florida USA

Unapproved Meeting Minutes

WG Chair Peter Zhao presided over the meeting, with Eric Weatherbee as Secretary. Introductions were made, and meeting rosters were circulated to record the attendance.

Total Attendance	58
Members in Attendance	23 out of 57 members, no quorum
Guests in Attendance	35
Guests Requesting Membership	6

The WG Chair noted that 56 comments have been received from the volunteer review group. At our current rate of review and disposition of 4-5 per meeting it will take approximately six years to complete. The Chair asks all participants to review the comments that are hosted on the website prior to the meeting to increase our pace of disposition. The Chair has a target date of 2020 to have a completed Draft.

The meeting focused on review of the comments received from the review group with the attendees. The following is a summary of those discussions and resulting disposition or follow up action to be taken:

Review Section: 4. Service Conditions: Page 5, Subclause 4.1, Line 30 – **Comment**: add 105°C maxi temp limit. **Proposed Change**: Add: and does not exceed 105°C maximum.

Discussion, disposition, and/or follow up action:

- After much discussion the group decided to add the following:
  - 105°C maximum oil temperature in contact with the bushing over a 24-hour period

Review Section: 4. Service Conditions: Page 5, Subclause 4.1, Line 31 – **Comment**: add temperature limit for bottom terminal connection, say, 105°C maxi temp. **Proposed Change**: Add: - The bottom terminal and lead connections do not exceed a 105 °C.

Discussion, disposition, and/or follow up action:

- Sebastien Riopel noted that IEC 60137-2017 has a table with temperature limits.
- Matthew Weisensee stated that the temperature of turret should be considered.
- It was decided that a Study Group would investigate the issue with a review of the IEC table and provide a suggested disposition by the next meeting.
  - Dave Geibel volunteered to be the lead for the Study Group. Additional volunteers: Juan Castellanos, Bruno Mansuy, Ryan Musgrove, Egon Kirchenmayer, Amitabh Sarker, Matthew Weisensee, Shibao Zhang and Peter Zhao.

Review Section: 3. Definitions: Page 2, Subclause 3.1, Line 25 – **Comment**: Ambient should be clearly the temperature outside any bus duct or enclosure. **Proposed Change**: Add: … the surrounding air in contact with the apparatus onto which the bushing is mounted, not inside bus ducts or enclosures.

Discussion, disposition, and/or follow up action:

- Accepted for addition by those in attendance.

Review Section: 3. Definitions: Page 3, Subclause 3.4, Line 6 – Comment: Some bushings are horizontal and have no "bottom end" **Proposed Change**: Change to suitable connector at the inboard end of the bushing for the transfer of current.

Discussion, disposition, and/or follow up action:

- Accepted for addition by those in attendance.

Meeting was adjourned.

Respectfully Submitted,
WG Secretary Eric Weatherbee

C57.19.100 Bushing Application Guide Meeting Minutes - 10/15/18 Fall Meeting

The meeting was called to order at 3:17 with people present, 19 members (out of 29), 14 guests and 17 new guests with 2 requests for membership. Quorum was achieved.

After introductions, a request for patent disclosures was made and none were presented.

The PAR will be submitted today.

No new proposals for change to the Guide were received prior to the meeting.

Discussion held regarding CB bushings, no new designs are being made for CB applications. C57.19.01-1991 is referenced for CB Bushing applications.

Discussion that Bushings are not designed for overload conditions. A bushing needs to be specified as needed for overload conditions that would be above the bushing rating. Only OIP bushings are mentioned in the guide and the calculations may not apply to non OIP bushings. A separate Task Force is being formed to discuss non-OIP bushings.

Discussion held on the test method for 55C rise in bushings. The test did not change, the maximum temperature is still 105C. Motion made by David Geibel seconded by Shibao Zhang to remove the 55C Derating Chart in section 5.2. Motion passed with 16 for and none against.

Motion made by David Geibel and seconded by Don Platts to approve the Spring 2018 Minutes.

Discussion held on proper handling of a bushing with PD that occurs during test. The bushing is vented to remove the condition and then re-tested allowing contaminated air inside and that It shall be resealed according to the bushing manufacturer's instructions.

The meeting was adjourned at 4:07 PM

Tommy Spitzer, Chair
Jeff Benach, Secretary
October 15, 2018

Distribution Transformer Subcommittee
Task force / Working Group Report

Document #:	PC57.19.02
Document Title:	Standard for Design and Performance Requirements for Bushings Applied to Liquid Immersed Distribution Transformers

Chair:	Ed Smith	Vice-Chair	Steve Shull
Secretary	Fred Friend		

Current Draft Being Worked On:	D1.2	**Dated:**	October 2018
Meeting Date:	October 16, 2018	**Time:**	11:00 am – 12:15 pm

Attendance:	**Members**	31
	Guests	28
	Total*	59

*** For details of attendance, please refer to AMS system of the Transformers Committee**

Meeting Minutes / Significant Issues / Comments:

The meeting was called to order by the Chair at 11:00am, the roster was circulated, followed with introductions of members and guests. The Chair made a call for any Essential Patent Claims and none were brought forward. A check for quorum was made and achieved. A motion was made by Dave Geibel and seconded by Jerry Murphy for approval of the agenda. The motion was unanimously approved. A motion was made by Dave Geibel and seconded by Jerry Murphy for approval of the spring 2018 meeting minutes. The motion was unanimously approved. Steve Shull informed the group that he and Ed Smith were exchanging roles. Going forward Ed will be the Chair and Steve will be the Vice-Chair.

The various Task Forces presented reports:

Taskforce report – Cantilever Design Test Requirements

This discussion was led by Steve Shull as he switched to the D1.2 document. He showed two sections that he had created for the bushing cantilever testing from the taskforce's report. One designed for leak detection and the other for ultimate strength testing. The discussion of the leak detection section led to these conclusions:

- It should be made clear somewhere in this section that leak detection would not be a part of the bushing manufacturer design testing but be solely the responsible of the entity making the application on the oil filled equipment.
- There will be a working torque value maximum based on the ultimate torque value developed from the ultimate strength test. A task force was formed to research C57.19.100 and IEC 60137 to develop what this level should be. The taskforce will be chaired by Steve Shull and the members will be Dave Geibel, Ed Smith, and Carlos Gaytan.
- The test conditions for this item were modified to 7 psi to coordinate with C57.12.39. There was some discussion concerning the temperature of the test but it was finally decided that the temperature would stay as shown but guidance would be added to how this test could be interpreted at higher temperatures. It was suggested that the test be at a fixed temperature then apply some type of margin could be applied. The taskforce will add this to their list for study.

The discussion of the bushing ultimate strength testing led to these conclusions:

Distribution Transformer Subcommittee
Working Group Report

- The application of the test load would be located at the minimum stud length point of the type of bushing that was being tested.
- The test on a stud mounted bushing will need more work as the direction of the force was not specified. It could be defined by either being in line with the stud mounting bolts or otherwise particularly when applied to the three bolt mounting design. A comment was made that if the three bolt pattern was mounted with the one bolt sustaining the full load, the rating of the bushing could be reduced as much as 20%. Another suggestion was just to state the bushing should be mounted in the worst case orientation which creates the lowest torque value. This item was added to the previous task force's research.
- It was suggested we change the word "distortion" shown in section 3.3.2 to "permanent deformation" to better match the terms used in C57.12.39. There was no opposition to this change.

Taskforce report – Standard Mounting Holes

Rhett Chrysler reported for Martin Rave. This task force was charged to develop the minimum stud length shown in Figure 4, Standard Mounting Hole and Stud Patterns. They surveyed three manufacturers and develop the following levels.

Mounting Hole Designation	Minimum Mounting Stud Length Recommendation	Minimum Mounting Stud Length Manuf. 1	Minimum Mounting Stud Length Manuf. 2	Minimum Mounting Stud Length Manuf. 3
SA	38 (1.50)	38 (1.50)	41 (1.63)	38 (1.50)
S	38 (1.50)	38 (1.50)	41 (1.63)	38 (1.50)
S1	38 (1.50)	51 (2.00)	41 (1.63)	38 (1.50)
S2	51 (2.00)	51 (2.00)	54 (2.13)	57 (2.25)

These minimum mounting stud lengths would be placed in the table shown in Figure 4.

Taskforce report – Stud Sizes

Al Traut reported that they developed a new drawing to show the stud mounted bushing with an internal spade connection. During the discussion it was found that a dimension was left off the drawing in that the spade width was not specified. Al and Steve Shull would work on adding the minimum width values to the drawing. Also a new stud size was discovered and added to standard stud size table. This task force was to verify the thread designation and useable thread lengths. These items will reported at the next meeting. As well the statement designating the measurements minimums would be removed and placed into the table headings so that it will be more than informative.

It was announced that the next meeting would be on March 26, 2019 in Anaheim, CA. The meeting was adjourned at 12:15 pm.

Submitted by: Fred Friend

Date: 10/17/2018

Bushing Overload Task Force

Meeting Minutes
Hyatt Regency Riverfront Hotel

Jacksonville, FL, USA
Monday, October 15, 2018
4:45 PM – 6:00 PM

The meeting was called to order by Chair Matt Weisensee at 4:45 pm on Monday, October 15, 2018 in Jacksonville, FL. Shibao Zhang was the acting Secretary due to the absence of Secretary Alwyn VanderWalt. The Vice-chair position is vacant.

There were a total of 59 attendees, including 15 members out of 22 listed members, so a quorum was achieved. 10 attendees requested membership.

A call for essential patent claims was made, but none were identified.
The attendees were asked to identify themselves and their affiliation.

The minutes of the last meeting in Pittsburgh, PA and the meeting Agenda were unanimously approved.

Per agreement in the last TF meeting the Chair created and ran two surveys.

The first survey was among bushing manufacturers, which was sent to 12 companies, and the Chair received 6 responses. The second survey was among transformer manufacturers, which was sent to 16 companies, and the Chair received 8 responses.

The Chair shared the 6 survey questions that were sent to the manufacturers and gave a short summary of the answers for each question. A documents with all the answers listed will be posted on IEEE Transformer Committee website for participants to review and discuss in future meetings.

There were wide and lengthy discussions of overload conditions of transformers and some general cases of bushing failures in specific applications such as solar farms which may not be related to the bushing overload.

The bushing Subcommittee Chair, Peter Zhao, suggested that the task force choose some reasonable content to be delivered within 2 or 3 years. Sebastien Riopel of Electro Composites suggested that we revise the task force scope to be "Bushing Selection Guide for Transformer overload conditions", which was echoed by other participants. Since many participants had left due to the meeting running overtime, no vote was held on this scope revision. The Chair agreed to email the full task force regarding the proposal to revise the task force scope and if possible conduct an email vote before the next meeting.

The meeting was adjourned at 6:15 pm

TF Chair: Matt Weisensee, PacifiCorp
TF Secretary: Alwyn VanderWalt, PNM
TF Acting Secretary: Shibao Zhang, PCORE Electric

Study Group on Bushing PD During Factory Transformer Testing

Proposed text to add to standards:

"If partial discharge is observed during the induced testing of the transformer and appears to be generated within an OIP bushing(s), it is permissible to "vent" the bushing(s) to atmosphere using the bushing manufacturer's instructions to allow for the dissipation of gas bubbles in the oil. Gas bubbles sometimes form following a temperature rise test during cool down or may be present for other reasons. Reestablishment of the bushing gas space blanket and resealing of the bushing must also be performed in accordance with the bushing manufacturer's instructions following completion of the induced test."

Annex B - Dielectric Tests Subcommittee

October 17th, 2018
Jacksonville, Florida

Dielectric Tests Subcommittee		
Chair: Ajith M. Varghese	**Vice-Chair: Thang Hochanh**	**Secretary: Poorvi Patel**
Room: Grand Ballroom 5	Date: October 17th, 2018	Time: 11:00 am to 12:15 pm
Members: 139	Present at time of checking: 96	Present per attendance roster & recorded to AM System: 96
Guests present: 114	Membership requested: X	Membership accepted: X

B.1 Chair's Remarks

The Chair briefly highlighted the requirement that while introducing one need to state their employer/ company and sponsor if the difference from the company. The chair also reminded that IEEE and transformer committees are non-commercial organizations and standards shall focus only on developing performance and functional requirement and not design and construction details.

The Unapproved minutes from the Spring 2018 meeting and the agenda for Fall 2018 meeting was sent out to members and guests 14 days before the Fall meeting, and it's also posted on the website.

An area that WG and TF have been late with and we need to improve is to send out the Agenda at least 14 days before the meeting. This also applies to on-line WG and TF meetings.

All TF and WG **MUST** record the attendance in the AM System- The WG/TF minutes do not need to include the list of attendees. The Roasters circulated in the meetings should not have the email addresses included to follow the data privacy policy. WG/TFs are urged to keep website information current. Any presentation presented during the meetings should be posted

The Chair clarified the Ballot resolution (BRG) group is now named as Comment Resolution Group (CRG) and CRG only need a simple majority to approve changes

All attendees should have updated information, such as email address in the AM system, as for all correspondence, this system is used.

The Chair reminded the WG and TF leaders to submit their minutes from the meetings within 30 days to the SC chair and secretary. The SC Secretary then has to submit the SC minutes within 45 days of the SC meeting. To minimize revision and errors in the sub-committee level and transformer committee level minutes, please send the final version of your minutes.

The Chair reminded WGs that call of the patent is required a during every WG meetings including on-line/Teleconference meeting. If there are any patent claim, it shall be noted but not discussed at the working group meetings. Calls for Patents is not required for TF.

Per new guidelines from IEEE, Audio/Video recording or photography is not allowed during SC, WG and TF meetings. The secretary could record the meeting for writing the minutes of meetings but this needs to be notified, and recording must be deleted after the use. Chair informed SC that the subcommittee Secretary would be recording the audio of the SC meeting for this reason today.

The Chair went through the new GDRP requirements. Please follow these requirements in your WG/TF meetings; *The GDPR applies to 'personal data' meaning any information relating to an identifiable person who can be directly or indirectly identified in particular by reference to an identifier. This definition provides for a wide range of personal identifiers to constitute personal data, including name, identification number, location data or online identifier, reflecting changes in technology and the way organizations collect information about people. Source: https://www.eugdpr.org/gdpr-faqs.html*

Some of WG/TG were late in sending the agenda for the Fall meeting. The invitation with agenda should be sent out 14 days before the meeting. Its required for the meeting conducted offsite or online/Teleconference aswell. Agenda shall include more details of topics that will be discussed so invitees can decide whether to participate on not.

The Chair shared details of upcoming PES sponsored meeting as well as details of next transformer committee. IEEE PES T&D Expo on April 16-19 of 2018 in Denver, CO, USA, and the next IEEE PES General meeting – Aug 5-9: Portland, Oregon, USA. The fall committee meeting 2018 will be held in Jacksonville, Florida 14th -18th of October 2018.

The Current Status of PARs was presented by The Chair.

- C57.127 Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers is expiring in 2018. Revcom is expected to review/approve the guide during an upcoming meeting in October. If approved, the guide will get published early 2019.

- C57.160 Guide for the Elec. Measurement of PD in HV Bushing and Instrument Transformers is in pre-ballot

- C57.113 Recommend Practice for Partial Discharge Measurement Power had their first meeting in March 2018 and Par expires 2021

- C57.98 Guide for Transformer Impulse Tests the PAR was approved at last meeting, and they had their 1st meeting here in Jacksonville. Par expires in 2022

- C57.138 Recommended Practice for Routine Impulse Tests for Distribution Transformers there is no activity on as the guide does not expire until 2026. If new WG needs to be formed earlier please advice to the chair

- C57.161 Guide for DFR Measurements is approved and published

- C57.168 Low-Frequency Test Guide is a new guide and had their first meeting here in Jacksonville; PAR expires 2022

- C57.200 Bushing Frequency Domain Spectroscopy Guide (ENTITY WG) is a new guide. PAR expires in 2022. The first meeting will be in the Spring 2019 meeting in Anaheim.

The Chair reminded the WG on attendance requirement for membership and the continuation and the requirement to have attendance updated in AM system, i.e., to attend two out of last three meetings or three out of five last meetings.

The secretary presented the new members and welcomed them to the subcommittee. 13 had requested membership in the last meeting in Pittsburgh, PA and 10 where accepted. Eight members were changed to guest status. The total membership of the Dielectric Subcommittee is today 139 members.

B.2 Quorum, Approval of Minutes and Agenda

The membership list was presented, and a quorum of members was established through the AM system. 96 out of 139 members were present. Thus 69% of members were present at the meeting, and a quorum was reached. For request of membership, please reach out to the chair or secretary.

Motion to approve the agenda was made by Dan Sauer and seconded by Bertrand Poulin. The chair presented the agenda, and it was unanimously approved.

The Motion to approve the Fall 2017 minutes was made by Dan Sauer and seconded by Bertrand Poulin. The minutes of the Spring 2018 meeting at Pittsburgh meeting was approved unanimously.

B.3 Taskforce and Working Group Reports

Working Group Low-Frequency Dielectric Testing for Distribution, Power and Regulating Transformers
Dan Sauer (Chair) at the meeting
Tuesday 16/10/2018, Jacksonville, FL.

The Chair called the meeting to order at 9:30 am.

The Chair showed the agenda below:

1. Chair's welcome
a. We are now a WG
b. Membership starts over with a WG – all who request membership today will become members
2. Introduction of Participants
3. Call for Patents
4. Approval of agenda
5. Discussion on approach
6. Request for Guide Material
7. New Business
8. Adjournment

The Chair asked participants to introduce themselves.
Since this was the first meeting for this WG, a quorum was achieved.
Total number of attendees: 66 (including Chair and secretary)
Participant requested and granted membership: 46
The Chair displayed the patent disclosure statement. There was no patent mentioned during the meeting.
Bertrand Poulin made first motion to approve the agenda, which was seconded by Wallace Binder.
Agenda was approved anonymously.
The chair stated the scope and purpose of this guide as shown below.
"Scope: This guide provides additional information on low-frequency dielectric tests applicable to distribution, power and regulating transformers."

"Purpose: The purpose of this guide is to provide background information on conducting and interpreting the results of low-frequency dielectric tests."

Chair opened the floor for discussion on what the group vision is on this new guide.
Dan Blaydon stated that it might be a good idea to start with impulse guide to see how it is structured.
There was a discussion on the definition of low-frequency dielectrics tests. Some asked whether or not the power factor should be included in this guide.
Chair kindly asked for experts to lead each specific test such as induced test, applied voltage test to include background summary on each test.
Bertrand Poulin mentioned that he sent some information on how to perform applied voltage test on high voltage windings with delta.
Bertrand Poulin suggested that once this guide developed, any tutorial information in any of the standards should be removed from those standards and moved to the new guide.

Chair clarified that C57.12.00 includes requirements, C57.12.90 explains how to perform tests, and the new low-frequency test guide will have background information and ways around difficult situations in performing a specific test.
The Chair asked the attendees on how to organize the guide.
Don Platts suggested to organize the guide by each specific test and remove any tutorial material from other standards. The removed tutorial material would be added to the new guide after coordination with the standard leaders.
Bertrand Poulin recommended having a leader to collect information on each specific test from all contributors instead of assigning a leader for each specific test as one person may contribute to multiple tests.
Don Platts volunteered to work with the Chair on creating an outline. The following meeting attendees volunteered to help the Chair with the outline: Garcia Eduardo, Babanna Suresh, John Foschia, Brian Penny, Jhala Anirudhdhsinh, Thomas Melle, and Alex Winter.
Wallace Binder recommended that the guide starts with definitions such as a low-frequency dielectric test to help in determining whether or not a test belongs to this guide.
Ajit Varghese recommended development of test list that belongs to this guide.
Bertrand Poulin suggested to come up with a maximum frequency to include in the definition of low-frequency dielectric test such as any test with a frequency below 1kHz to verify the quality of insulation under AC supply.
John Foschia suggested adding examples of circuits representative of tests for new engineers. John Foschia agreed to supply examples to the Chair.
There was no new business.
The motion was made by Bertrand Poulin to adjourn the meeting and was seconded by Garcia Eduardo.
The meeting was adjourned at 10:40 am.

WG C57.113 - Recommended Practice for PD Testing, March 27th, 2018 – 3:15 pm
Ali Naderian – Chair, Janusz Szczechowski – Vice Chair
John Foschia – Secretary

Meeting Attendance

The working group met at 3:15 pm. There were 51 attendees, and 17 members out of 27 were present. The quorum requirement was met. Attendance and membership are completed in the AM system except one attendee who was not found in the system.

Discussions

The meeting began with introductions and a call for essential patent claims. None were brought to the working group's attention. The agenda of the meeting was unanimously approved (motion by A. Kraetge and seconded by D. Gross). The minutes of the Pittsburgh meeting were unanimously approved (motion by A. Kraetge and seconded by R. Fausch).

The chair provided a summary of the participants who have volunteered to improve the specific sections of the guide. Chapters 4 & 5, as well as annexes A, F, & G, have volunteers who will be providing improvements to these sections.

A significant portion of the meeting was composed of presentations made regarding the historical background of partial discharge measurement and the progression of technology related to the measurement of PD. Detlev Gross provided updates regarding IEC's latest amendments to IEC 60270. Mr. Gross advised the opportunity to synchronize the tutorial section of C57.113 with IEC 60270 and to include the background of the physics associated with partial discharge.

Mr. Kuppuswamy recommended including specifications of the measuring impedance in a revision of C57.113. It was advised by participants that this topic may be best left to the measurement equipment OEMs and that this proved to be too much information for the latest IEC revision of 60270.

The meeting was finalized with a presentation by the vice-chair illustrating various types of PD noise patterns and modern technology for measuring PD. The chair suggested that a survey should be sent out regarding the frequency ranges of measurement. This was supported by the working group; the chair will compose a survey for the working group.

Adjournment

The meeting was adjourned at 4:30 pm (motioned by A. Kraetge and seconded by D. Gross).

John Foschia

B 3.7 Working Group for PD in bushings, PTs and CTs – PC57.160
WG Secretary: Thomas Sizemore; WG Chair: Thang Hochanh
Meeting Minutes Jacksonville, FL

This working group did not meet in Jacksonville. The guide is currently in Ballot process.

Working Group for Impulse Guide – PC57.98

WG Secretary: John Foschia; WG Chair: Thang Hochanh; WG Vice Chair: Reto Fausch

Meeting Minutes October 15, 2018, at 1:45 – Jacksonville, FL, Grand Ballroom 6

Meeting Attendance

The working group met at 1:50 pm. Present at the meeting were 84 attendees, 30 of whom requested membership. Being the first meeting of this working group, attendees who requested membership will be granted membership. Attendee entries to the associated management system are incomplete at this time.

Discussions

The meeting began with a brief overview of the present guide. It was noted that the most recent revision of the guide is well written. The primary discussion focused on the future inclusion of 'K-Factor' related material as it is now required for evaluation impulse wave traces for compliance to IEEE standards. The consensus of the working group's participants was that the purpose of the guide is to emphasize how to work with K-factor evaluation and not its benefits/shortcomings.

The chair requested that OEMs and test laboratories provide examples of highly oscillatory waveforms in .csv or T.D.G. ('test data generator') format. Multiple entities who provide waveform analysis software offered to evaluate these anonymous waveforms to understand variance in the resulting waveform parameters. Participants generally agreed that the guide should provide its audience with methods of handling discrepancies in the waveform analysis.

The chair also discussed some other minor changes to be made:

- Remove the reference to analogues recordings of the test waves
- Update the displayed waves with the more recent waves presentation

Further input will be sought for additional material or modifications to the guide at the next meeting in Anaheim, CA in March 2019.

Adjournment

The meeting was adjourned at 3:00 pm without formal motions to close.

WG - IEEE Guide for the Detection of and Location of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers and Reactors (C57.127)
Chair: Detlev Gross Chairs Vice Chair: Jack Harley Secretary: David Larochelle

WG on C57.127 did not meet at Jacksonville

WG Chair updated during DTSC that Balloting is complete and the document is under RevCom review.
WG chair clarified that there was one negative vote related to essential patent claim the which was resolved as per IEEE Standard policy guidelines
If Revcom approves, The document is expected to be published in early 2019

TF on External Dielectric Clearances,

Jacksonville, October 15th 9.30 am, Eric Davis, Chair; Troy Tanaka, Secretary

The Task Force on External Dielectric Clearances met on Monday, October 15, 2018, at 9:30 AM in the Hyatt Regency Jacksonville Riverfront, Grand Ballroom 7. There were 58 people in attendance; 8 of 13 members, and 50 guests. Several guests requested membership but will not be granted membership because the task force finished its work. The full attendance record is available in the AM System.

Several activities occurred between the Spring 2018 meeting and the Fall 2018 meeting. Those activities included 1) email approval of the Fall 2018 meeting minutes and changes discussed during the Spring 2018 meeting (11 approvals, 0 nays, 1 abstention) and 2) a survey of the Dielectric Test Subcommittee with the revised proposed text "C57.12.00 Section External Clearances Proposed 180326".

A survey was sent to 138 members of the Dielectric Test Subcommittee on October 8, 2018, with the revised proposed text to C57.12.00 Section of External Clearances. The following responses were received.

- 22 Responses
  - 17 Approvals,
  - 5 Approvals with Comments
- 3 Abstentions

The meeting in Jacksonville was brought to order at 9:31 AM. A motion was made by Dan Sauer and seconded by David Wallace to approve meeting agenda. Agenda was approved.

A motion was made by Dan Sauer and seconded by Vinay Mehrotra to approve Spring 2018 Pittsburgh meeting minutes as drafted. Minutes were unanimously approved.

The Task Force discussed the results of the Survey of the Dielectric Test Subcommittee and made minor editorial changes. In general, the comments addressed:

- The wording of the sentence is addressing clearances required for factory testing.
- The wording of the footnotes c and d.
- Correcting the references to the notes and footnotes.
- The wording of Note 1.

The survey results are attached for reference.

A motion was made by Dan Sauer and Seconded by David Wallace to send the proposed text as revised during the meeting to the Dielectric Test Subcommittee for Sponsor ballot. The motion passed with a vote of seven yes votes, zero no votes, and with one member having left early.

The chair thanked the task force for their work throughout the process and stated that the text and table would be sent on for inclusion in the next revision of C57.12.00. As a result, the task force will not have any further meetings until comments are received from the Sponsor ballot.

A motion was made by Dan Sauer and seconded by Vinay Mehrotra to adjourn the meeting at 10:33 AM.

During DTSC, Eric Davis (TF Chair) motioned for Dielectric Test Subcommittee's Approval to send the proposed text related to External Clearance to Standards Subcommittee to include in next revision of C57.12.00, as when it will be sponsor balloted

The proposed text was surveyed within Dielectric Test Subcommittee before the F18 meeting with response 22 Responses - 17 Approvals, 5 Approvals with Comments, 3 Abstentions. Comments were reviewed during the F18 Taskforce meeting, and the text was approved with minor editorial changes.

The motion was seconded by Dan Sauer and was unanimously approved.

B.3.4 TF on Revision of Impulse Tests
Pierre Riffon, Chair; Daniel Sauer, Vice-Chair

The TF met on October 16, 2018, from 4:45 pm to 6:00 pm. Twenty-five (24) members and forty-three (32) guests attended the meeting. Four (4) guests requested membership. The meeting was chaired by Pierre Riffon, Chair of the TF. Mr. Daniel Sauer was the vice-chair.

Meeting has been called to order by the Chair at 4:45 pm.
Attendance has been recorded in the AM system.

Required quorum was met, presence of at least 22 members was required. The TF membership roster has been reviewed after the Pittsburgh meeting and members who did not attend the last three meetings have been moved as guests.

The agenda has been approved unanimously. The motion was made by Mr. D. Wallace and was seconded by Mr. J. John

The Pittsburgh meeting minutes were approved as written by all members present. The motion was made by Mr. A. Varghese and was seconded by Mr. S. Antosz.

The first item of business was related to a revised proposal of modifications to clause 10.3.2.1 of C57.12.90 concerning the condition of tertiary and stabilizing windings during lightning impulse tests. This proposal was sent within the TF membership and guests. The proposal gets a 100% approval rate. Several editorial comments were received and were taken into account. The use of the term "open terminals" vs "floating terminals" was discussed and the WG supported the use of "open terminals" as stated in the Chair's proposal . A motion to survey this revised proposal to the Dielectric SC level has been made by B. Poulin and seconded by J. McBride. This motion was approved unanimously The revised proposal will be surveyed to the Dielectric SC before the Anaheim meeting.

The second item of business was related to a revised proposal of modifications to clause 10.2.4 of C57.12.90 concerning the tap changer position during switching impulse tests. This proposal was sent within the TF membership and guests. The proposal gets a 92.9% approval rate with 3 negatives. Comments received have been discussed and the Chair presented a revised proposal which is mainly editorial in nature. A motion to survey this revised proposal to the Dielectric SC level has been made by B. Poulin and seconded by S. Brzoznowski. This motion was approved unanimously The revised proposal will be surveyed to the Dielectric SC before the Anaheim meeting.
Under New Business, Sanjib Som asked at the Pittsburgh meeting to add voltage transfer measurement during lightning impulse tests. Mr. Som did not sent any material and this subject was not discussed. This item of business will be kept on the agenda for the Anaheim meeting.

The meeting adjourned at 5:35 pm on October 16, 2018. The adjournment motion was made by Mr. F. Leal and was seconded by Mr. J. McBride.
The next meeting is planned to be held in Anaheim, California on March 26, 2019.

Pierre Riffon P. Eng.
TF Chair
October 16, 2018

- ***During DTSC, Pierre Riffon motioned to re-survey,***

    - ***Changes to Section 10.3.2.1 of C57.12.90 related to the condition of tertiary and stabilizing windings during the lightning impulse test***
        - ***Prior Survey had 100% approval and proposed text address some of the comments.***

    - ***Tap changer position during switching impulse tests***
        - ***Prior Survey had 92.9% approval, and proposed text is intended to address the three negative votes***

- ***Both the motions were seconded by Dan Sauer and were unanimously approved.***

B.3.5 TF on Revision of Low-Frequency Tests

Jacksonville, FL – October 16, 2018, 1:45 p.m., Chair: Bill Griesacker, Vice Chair: Daniel Blaydon, Secretary: Myron Bell

There were 98 attendees, 35 of 59 members and 63 guests were present at the meeting; 9 guests requested membership, 5 were granted, 7 members were moved to guest status, based on attendance. More than 50 % of the working group members were in attendance at the meeting. Therefore a quorum was present.

1. The meeting was called to order at 1:45 PM.
2. Attending members were counted, and a quorum was verified.
3. There were no objections to approval of the agenda.
4. There were no objections to approval of the meeting minutes from the 2018 Spring meeting in Pittsburgh.
5. Task Force Report
    a. TF, Factory PD Limits – Vinay Mehrotra

The meeting was called to order at 3:15 PM. There were 112 participants, and 55 of 82 members were present during the current meeting. A quorum was achieved. The agenda and minutes of the Pittsburgh meeting were unanimously approved. Chairperson provided a background of the taskforce and read out the new scope of the TF as follows:

Review and modify

a) Induced-voltage test for Class II power transformers clause 5.10.5.5 of IEEE Standard for General requirements C57.12.00
b) Test procedure clause 10.8.2 and Failure detection clause 10.8.5 of IEEE Standard Test Code C57.12.90.

The motion was carried out for the newly revised scope. The first motion was approved by Vijayan, and it was second by Hakim. Total 39 members favored the newly revised scope of the TF during the vote.

Vinay motioned for the members of the TF for Continuous Revision to Low Frequency Tests approve the scope change as worded above. The motion was 2nd by Hugo Flores.

Steve Antosz commented that the TF for Factory PD Limits name should be changed for the next meeting, to clarify, based on the new scope.

28 approved
0 Disapproved
1 Abstention

6. Study Group
    a. PD in bushings during factory transformer testing – Dave Geibel

Proposed text to add to standard C57.12.90 Section 10.8.5:

"If the partial discharge is observed during the induced testing of the transformer and appears to be generated within an OIP bushing(s), it is permissible to "vent" the bushing(s) to the atmosphere using the bushing manufacturer's instructions to allow for the dissipation of gas bubbles in the oil. Gas bubbles sometimes form following a temperature rise test during cool down or may be present for other reasons. Reestablishment of the bushing gas space blanket and resealing of the bushing must also be performed in accordance with the bushing manufacturer's instructions following completion of the induced test."

Dave Geibel motioned for the members of the TF to move this text to the Dielectric Test SC, for suggested addition to C57.12.90, section 10.8.5. The motion was 2nd by Hugo Flores.

30 approved
1 Disapproved
0 Abstention

7. Old business

a. Tap changer position during induced test.

Bertrand Poulin reviewed the changes required to achieve 100% approval.

Bertrand motioned to pass his report to the Dielectric Test SC, for inclusion into C57.12.90
2nd from Dan Sauer

28 approve
0 disapprove
1 abstain

This text will eventually be moved to the Low-Frequency Test Guide, once complete.

b. Applying pressure inside a transformer tank during induced test (survey results)

Steve Antosz presented text and results of the previous survey, reflecting 92% approval.

Steve motioned to move the text to the Dielectric Test SC, for inclusion into C57.12.90
2nd from Bertrand Poulin

29 approve
0 disapprove
3 abstain

c. Clarification of measuring voltage during low-frequency dielectric tests

Bertrand has not yet drafted a new proposal. He indicated he may need to delegate this to someone else, or suggested we simply refer to the wording in IEEE Std 4.

d. Class I transformer PD test – Don Ayers

Don Ayers was not present, so this topic was tabled until the next meeting.

e. Gassing issue for certain types of transformers with wound cores: proposal for new design test

Phil Hopkinson was not present to present the results of the previous survey
Dan Sauer gave a history of the topic, and voiced opposition to the current wording. Dan would like this topic to exclude transformers rated at 500 kVA and below.
Bertrand Poulin proposed that the latest survey results should be shared with the group, from Phil Hopkinson, prior to changing any text. The Chairperson agreed.
The chairperson suggested having a liaison between the LFDT TF and the Distribution XFMR SC, to ensure proper representation of the group that will be primarily affected.

8. New business

There was no new business.

9. Adjournment

Adjournment was at 3:00 pm

- ***During DTSC, Bill Griesacker (TF chair) motioned***
    - ***To survey in the Dielectric Test Subcommittee, the proposed text related to PD and Venting of Bushings during Transformer Factory Acceptance testing***
        - ***Second Dan Sauer.***
        - ***During the discussion, Joe Foldi remarked that Bushing manufacturing recommended procedure shall be followed during venting of business,***
        - ***The motion was unanimously approved.***
    - ***For Dielectric Test Subcommittee's Approval to send the proposed text related to Tap changer position during Induce test to Standards Subcommittee to include in next revision of C57.12.00, as when it will be sponsor balloted.***
        - ***Dan Sauer Seconded the motion.***
        - ***The proposed changes were surveyed multiple times within TF and DTSC and had a high approval rate***
        - ***The motion was unanimously approved.***
    - ***To include text for Applying pressure inside a transformer tank during the induced test to C57.12.90.***
        - ***Second Rashed Minhaz.***
        - ***The proposed Text was surveyed within TF and DTSC multiple times and had high approval rate.***
        - ***The motion was unanimously approved.***

B 3.8 Task Force Winding Insulation Power Factor & Winding Insulation Resistance Limits
Diego Robalino (Chair) and Greg Lobo (Secretary) at the meeting
Tuesday 16/10/2018, Grand Ballroom 2 & 3, Jacksonville, FL.

Activity Name: TF Winding Insulation PF/Resistance Limits
Activity ID: 2186
Number of Members in Activity = 44
Number of Members Present = 27
Quorum Present = 61.4%
Number of attendees = 111
Meeting initiated at 08:00 AM at the Grand Ballroom 2 & 3
Hyatt Regency, Jacksonville FL USA
Diego Robalino (Chair) at the meeting
Meeting started with the introduction of attendees
Headcount 22 members, reached a quorum to approve agenda for meeting and minutes from F17 meeting.

- TF identified IEEE SA staff to arrange NDA and DB
- Description of NDA
- A brief description of the DB
    - The team assigned to test DB by mid-November
    - Review filters and input data
- Presented data for accuracy of instrumentation for PF testing as provided by manufacturers
    - Information to be circulated for comments
    - Suggested for the document:
        - Below 1% PF : ±2% of reading ± 0.05 absolute
        - Above 1% PF: T±2% of reading ± 0.05 absolute
- Presented a chart showing all data received without the need of NDA
    - Data fluctuates from almost 0 to ~ 1% PF
- No new topic for discussion.
- Adjournment at 9:02 am

B.3.7

B.4 Liaison Reports

IEEE High-Voltage Testing Techniques Subcommittee
Liaison Report to Dielectric Tests Subcommittee of IEEE Transformers Committee
Submitted by Jeff Britton (HVTT Subcommittee Chair)
October 17th, 2018
Jacksonville, FL

- HVTT Subcommittee hasn't met since 2018 PES Joint Technical Committee Meeting in January 2018

- Active Projects Include

  - IEEE P1122 – Impulse Digitizer Standard. In draft development, PAR expires end of 2019 – Chair: Jeff Britton, Phenix Technologies, Inc.

  - IEEE P510 – High Voltage Safety Guide. Met at PES General Meeting in August 2018 in Portland, OR. The Guide is presently in draft development, PAR expires end of 2020 – Chair: Jeff Hildreth, Bonneville Power Administration

  - IEEE P2426 – Field Measurement of Fast Front and Very Fast Front Overvoltages in Electric Power Systems (Entity PAR). In draft development, PAR expires and of 2021 – Chair: Shijin Xie, State Grid Corporation China

  - Task Force for Title, Scope and Purpose for General IEEE PD Measurement Guide – Chair: Nigel McQuin, McQuin Power Consulting. Future WG will be chaired by Detlev Gross, Power Diagnostix

  - New Task Force for Title, Scope and Purpose for IEEE Standard 4 Implementation Guide – Chair: Bill Larzelere, Evergreen High Voltage

- Next meetings: Scheduled during week of October 29th in Orlando Florida, following the IEEE Insulated Conductors Committee Meeting

- Electronic attendance is offered for most HVTT SC, WG and TF meetings via web meeting, so physical attendance is not required to participate and qualify for membership

- Contact Jeff Britton or Jim McBride to participate

B.5 Discussions

B.6 Old/ Unfinished Business

1. Core gassing and PD Testing on Wound Core Transformer

- This topic was discussed during Fall18 Low-frequency task force. See TF Minutes for details.
- No further action is planned by DTSC until Low-frequency Task Force recommends SC on next steps.

2. C57.13-2016: Sec 11.3.1.7 Impulse guide for Instrumental Transformers

- There is a conflict between C57.13-2016 and C57.12.00 and C57.12.00 for Impulse waveform superimposition is requested between first FW and Final FW. Instrument Transformer SC plan to correct it through corrigendum along with some other corrections that they had identified
- No further action is planned to be taken by DTSC on this issue

B.7 New Business

1. Entity PAR: DFR guide for Bushings C57.200

- IEEE SA received Entity PAR for a new standard on Bushing Frequency Domain Spectroscopy from China.
- A Presentation was made during S18 TC meeting, and Transformer Adcom reviewed and approved PAR after S18 meeting, with the caveat of establishing an oversight TF that will report to Dielectric Subcommittee as most work will be done in Asia.
- IEEE-SA approved PAR. New Guide will have number C57.200
- Most WG Meeting will be outside of United States but WG chair or representative plan to attend Spring 2019 meeting in Anaheim CA.

- A Motion to create a Liason Task Force to coordinate WG with DTSC was moved by Hemchandra Sherdukte and second David Wallace.

- During the discussion, many members reported concern on Entity WG process due to limited involvement of transformer Committee. Sue McNelly clarified that irrespective of transformer committee approval, IEEE rules allows EntityWG to move forward and its best interest of transformer committee to have work with Entity WG. By having the guide under C57., any future revision to guide will go through transformer committee like all other standard and transformer committee will have to say in approval before WG can go for sponsor ballot

- Motion carries according to the books. - Approve- 6 Oppose- 1 Abstain- 35 (majority)

- The scope for the TF as approved
  - ❖ *Liaison between Entity working group and Transformer Committee*
    - *Participate in WG meetings as Technical Experts/Observers subjected to IEEE Entity WG participation/Membership rules*
    - *Provide status update to DTSC and Adcom on the progress of Standard development*
      - *Strive to have at least one TF meeting a year during transformer committee*
    - *Report any concerns regarding deviation from Transformers Committee's Policies and Procedures for Standards Development (Transformers Committee P&P)*
  - ❖ *Provide recommendation to Transformer Adcom regarding Final Approval of before standard goes to the ballot.*

B.8 Adjournment

Meeting adjourned 12.20 PM. Motion to adjourn made by David Geibel and Dan Sauer

Minutes respectfully submitted by:
Poorvi Patel
Secretary DTSC.

Annex C Distribution Subcommittee – Chair: Stephen Shull

October 17, 2018
Jacksonville, FL, USA

Chair: Stephen Shull
Vice-Chair: Jerry Murphy
Secretary: Josh Verdell

C.1 General Opening

Steve opened the meeting welcoming everyone to the meeting. Jerry circulated the rosters. To establish a quorum, a list of members was displayed and a count of was made. We did have a quorum with 41 of the 71 members in attendance by count of those identified on a slide presented in the meeting. Recorded attendance gave 115 in attendance and 41 members.

The agenda was reviewed, motion made, seconded, and approved by unanimous acclamation of the members in attendance.

The Spring 2018 meeting minutes were reviewed, and a motion was made, seconded, and approved by unanimous acclamation of the members in attendance.

C.2 Working Group and Task Force Reports

[redacted]C57.12.20 – Overhead Distribution Transformers – Al Traut

Al presented the following minutes from the working group meeting on October 15, 2018 at 11:00 a.m. with 65 in attendance.

The meeting was called to order by the Chair (Al Traut) at 11:06AM on Monday October 15th 2018. The roster was circulated followed by the introduction of attendees stating their name and company affiliation.

Quorum Verification

A members list was displayed and members were asked to raise their hands. 26 members were present. A Quorum was declared.

Confirmation of the essential patent statement and responses

There was a call for essential patent by the Chair. There were none brought forward. The Chair announced if there was on to let the Chair or Vice Chair know.

Approval of minutes of the previous meeting

The Chair sent out the minutes prior to the meeting for review. He requested approval of the Minutes for the Spring 2018 meeting in Pittsburgh, PA. A motion was made and seconded for approval. The minutes for the Spring 2018 meeting in Pittsburgh was approved with no negative votes

Approval of agenda for this meeting.

The Chair sent out the Agenda prior to the meeting for review. He requested approval of the Fall 2018 Agenda. A motion was made by: Said Hachichi and seconded by: Paul Chisholm for approval. The minutes for the Spring 2018 meeting in Pittsburgh was approved with no negative votes

Chair Report

The Chair discussed that during publication of C57.12.20 an error was made to the labeling of terminals on Figure 6 an errata has been published to correct the mistake.

Al review the PAR for Revision for C57.12.20. The Title, Scope and Purpose for PAR submittal was reviewed. A question was brought up about increasing the upper kVA to 1000 and including platform mounting. Considerable discussion centered around this topic but it was decided to move forward without it. A Motion was made to leave the Title, Scope and Purpose as is in the present document. Motion made by: Alan Wilks and Seconded by: Mike Faulkenberry to keep the scope as is. Motion passes unanimously.

The Chair asked for a volunteer to pick up the secretary position. The Chair also asked for volunteers to assist with document editing and proof reading.

The Chair noted the possibility of relinquishing our meeting slot to allow for another WG at the next meeting to accommodate other documents that are close to expiring.

Old Business

Carlos Gaytan presented information on the newly published C57.12.39 2017 document that will be incorporated into 12.20. Carlos review the changes in the document with the group. A Motion was made by: Igor Siminov and Seconded by: Said Hachichi to include the changes in our document. There was no opposition MOTION PASSED

Giuseppe Termini led discussion to include T connected Transformers. If it is adopted it would be included in table 11. A motion was made to include the T connected transformers. Motion made by: Giuseppe Termini and Seconded by: Brian Klaponski. There was no opposition MOTION PASSED

The Chair discussed the possibility of rearranging some of the sub classes under the construction clause 7. Al reviewed an outline of the proposed changes. Al will move forward to prepare a draft of Clause 7 for review at the next meeting.

Mike Thibault discussed tank finish and corrosion as referenced in C57.12.30. Mike presented some specifics on the .30 document and the lack of costal application guidelines. When SS is specified it should follow C57.12.30 document. This will be added to the clause on tank and finish.

New Business

No new business brought forward

Next meeting--date and location

The Next meeting will the 2019 Spring: March 24-28; Anaheim, California USA

The meeting was adjourned at 12:05PM

Meeting adjourned 11:40

Submitted by: Ed Smith

[redacted]C57.12.28, .29, .30, .31 & C57.12.32 – Enclosure Integrity – Dan Mulkey

Dan Mulkey presented the following minutes from the working group meeting on October 16, 2018 at 8:00 a.m. in with 58 in attendance.

Before the meeting:

1. An email vote was called on 6/20/2018 by Dan Mulkey in response to the open motion made by Mike Thibault in the 03/27/2018 meeting in Pittsburgh which was tabled. The vote closed on 6/29/2018.
   The motion was to include a vacuum test along with the pressure test with the following parameters:
   - Apply 10 feet of pressure (4.5 psi)
   - 1 foot of water submersion
   - 7 days of vacuum, 7 days of pressure
   - Pass criteria: the final gauge reading is the same as the initial (within 0.1 psig) and no observable water leaks

   The motion failed with 20 opposed, 15 in favor and 1 abstention. 36 of 48 members voted.

2. An email motion was made by Igor Simonov and seconded by Guiseppe Termini to accept the addition of 3.2.1 Design Submersibility Test:

   An email vote was called on 6/30/2018 by Dan Mulkey on the motion. The vote closed on 7/13/2018.

   The motion failed with 29 opposed, 12 in favor and no abstentions. 41 of 48 members voted.

3. ENCLOSURE·DESIGN¶

3.2 Submersibility·Testing¶

3.2.1 Design·Submersibility·Test¶

The·assembled·piece·of·equipment·shall·be·pressurized·to·49·kPa·(gauge)·(7·psig)[‡] and·then·submerged·so·that·the·topmost·portion·of·the·equipment·is·30·cm·(12")·underwater[‡]. Once·the·initial·bubbles·from·trapped·exterior·air·have·dispersed,·the·submerged·equipment·shall·be·observed·for·pressure·loss·and·bubble·formation·for·a·minimum·of·10·minutes.··Pass·criteria·is·no·bubble·formation·and·with·no·loss·of·internal·air·pressure·greater·than·0.7·kPa·(gauge)·(0.1·psig).·Pressure·monitoring·shall·be·with·a·gauge·accuracy·of·± 0.1%·or·better.¶

NOTE—Since·the·equipment·is·internally·pressurized,·increasing·the·submersion·depth·would·reduce·the·stress·on·the·equipment·unless·the·water·depth·exceeded·10·m·(33·ft).¶

3.2.2 Production·Submersibility·Test¶

Each·piece·of·assembled·equipment·shall·pass·a·suitably·designed·leak·test.¶

1)→ Pressurized·and·then·submerged·in·water·without·air·bubbles·streaming,·or¶

2)→ Pressurized·and·tested·with·chalk·dust,·or¶

3)→ Pressurized·and·held·for·suitable·time·without·any·loss·of·pressure¶

¶

[‡]·Based·on·withstand·without·permanent·distortion·pressure·in·IEEE·C57.12.39,·Standard·for·Distribution·Transformer·Tank·Pressure·Coordination¶

[‡]·Based·on·Accelerated·sealing·life·test·in·IEEE·386,·Standard·for·Separable·Insulated·Connector·Systems·for·Power·Distribution·Systems·Rated·2.5·kV·through·35·kV¶

Meeting Minutes / Significant Issues / Comments:

1. Dan Mulkey called the meeting to order at 8:03 AM.
2. Introductions were performed.
3. Membership changes were noted:
   a. Removed: Sanjib Som
   b. Added: David Blew, Justin Minikle, Michael Morgan, Babanna Suresh, Ben Garcia

4. Quorum was verified. The working group consisted of 49 members, requiring 25 for quorum. 31 members were confirmed at the time of counting. 33 members were confirmed afterwards through the roster.
5. Steve Shull made a motion, seconded by Igor Simonov for approval of the minutes. No opposition was raised so the minutes were unanimously approved.
6. Dan Mulkey made a call for any essential patent statements and responses. None were raised.
7. Steve Shull made a motion, seconded by Mike Thibault for approval of the agenda. No opposition was raised so the agenda was unanimously approved.
8. Status of Standards:
    a. C57.12.28 Standard for Pad-Mounted Equipment – Enclosure Integrity, Published July15, 2014, Revision Due: 12/31/2024
    b. C57.12.29 Standard for Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published August 8, 2014, Revision Due date 12/31/2024
    c. C57.12.30 Standard for Pole-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published September 20, 2010, Revision Due: 6/17/2020
    d. C57.12.31 Standard for Pole Mounted Equipment – Enclosure Integrity, Published September 20, 2010, Revision Due: 6/17/2020, Corrigenda approved May16, 2014
    e. C57.12.32 Standard for Submersible Equipment – Enclosure Integrity, Reaffirmed 3/7/2008, Revision Due: 12/31/2018, PAR expiration: 12/31/2019
9. Old business:
    a. Dan Mulkey informed the group that the motion to add a design submersibility test had failed through an email vote. The vote had occurred between the Spring 2018 meeting in Pittsburgh and this Fall 2018 meeting in Jacksonville.
10. New business:
    a. Dan Mulkey informed the group that the draft standard of C57.12.32 had been sent for MEC review. The review had been delayed due to a lost email, but has now been completed with some comments for the group to review.
    b. A motion was made by Ed Smith and seconded by Babanna Suresh to approve Draft 2.6 for ballot and form a comment resolution group to make the resulting changes, including the MEC comments, prior to the Spring meeting. The motion passed unanimously with 32 in favor and none opposed.
    The following members agreed to join the comment resolution task force: Dan Mulkey, Justin Minikel, Jerry Murphy, Jeremy Van Horn, and Ben Garcia.
    c. Dan Mulkey asked the working group if it would be better to combine the C57.12.30 and C57.12.31 documents into one standard for the next revision, or if they should be kept separate. Justin Minikel offered to help combine the documents if the group decided to do that. A few points for consideration were raised in the ensuing discussion:

i. The documents are currently referenced in other standards such as C57.12.20; if the documents change those references may be out of date. Combining into one document will require that a new standard number be generated and assigned to the new document.
ii. Users often specify which standard they want when purchasing transformers; if the standards are combined it will introduce ambiguity as to what the user is looking for.

A straw poll vote was taken amongst the working group about whether to combine the standards into one document on the next revision cycle or to keep them separate. The majority of the group voted in favor of keeping them separate, with 3 members voting to combine.

The scope and purpose of C57.12.30 and C57.12.31 were reviewed:

iii. It was discussed whether or not to include control cabinets into the scope of the C57.12.30 revision. The scope currently has the words 'not limited to' which may mean it's already covered. Control cabinets are typically not in excess of 600V.
iv. Justin Minikel informed the working group that the Switchgear subcommittee is working on a PAR to include Enclosure Integrity into Switchgear.
v. It was confirmed that the scope of the pole-mounted Enclosure Integrity standards includes platform mounted transformers as well.

A motion was made by Mike Thibault and seconded by Igor Simonov to submit a PAR for both C57.12.30 and C57.12.31 separately without changing the scope of the documents. The motion passed with unanimous approval.

A task force was formed to take the C57.12.32 standard once it has been balloted and apply the changes to the C57.12.30 and C57.12.31 documents. The task force included the following members: Justin Minikel, Babanna Suresh, Jeremy Van Horn, Jerry Murphy, and Dan Mulkey.

11. The meeting was adjourned at 8:39 am.
12. The next meeting will be held on March 26, 2019 in Anaheim, CA, USA

Copies of any handouts and/or subgroup reports will be made available as separate items but referenced by these minutes.

The following attendees requested membership and will be added to membership for the Fall 2018 meeting:

- Martin Bachand
- David Blew
- Douglas Craig
- William Elliot
- Matthew Enders
- Kenneth Hampton
- Juan Ramirez
- James Ratty
- Pedro Salgardo
- Robert Tinsley

Submitted by:Jeremy Van Horn

[redacted]C57.12.34 – Three Phase Pad-Mount Transformers – Ron Stahara

Ron Stahara presented the following minutes from the working group meeting on October 15, 2017 at 3:15 p.m. with 82 in attendance.

Steve Shull called the meeting to order and introductions were made. The rosters were circulated. The names of those in attendance are recorded in the AM system. To establish a quorum, a members list was displayed on the screen and those who saw their names were asked to stand. From the people standing, it was determined a quorum was established. Patent requesting slides were displayed and Steve Shull asked for any known patents to which no one responded. The agenda was presented and a motion to accept it was made by Gael Kennedy and seconded by Ed Smith. The motion was approved unanimously. The Spring 2018 minutes were presented and a motion was made to accept them by Gael Kennedy and seconded by Paul (John) Chisholm. The group approved the motion unanimously.

Steve Shull asked Carlos Gaytan to speak about the work in C57.12.39 and how it relates to this standard's Section 9.4.1. Carlos made several comments concerning the verbiage but acknowledged that the current C57.12.39 doesn't address negative pressures. He recommended that we leave this section as written, replacing only the word "distortion" with "deformation". Dan Mulkey made a motion, seconded by Jerry Murphy, to replace the word "distortion" in the text with the word "deformation". The motion was approved unanimously.

Steve Shull asked for comments on Section A.1 and none were offered by the Working Group.

Steve Shull asked for comments on Section A.2 and none were offered by the Working Group.

Steve Shull asked for comments on Section A.3. It was pointed out that there was an editorial issue. Steve Shull changed the word "show" to "shown". Steve Shull asked Jim Antweiler to explain his submitted comment: "…How was the selection of the accessories gathered for this Annex." He felt that there might be some missing accessories. The one for this section might include Vacuum Fault or Molded Vacuum Interrupter (VFI). Jim stated that VFIs are typically used when the current becomes too large for a fuse to be used. Dwight Parkinson commented that VFIs were not included in the Annex because the Annex was designed to list the more common components which have availability from multiple manufacturers. This last point was made as in-tank VFIs are currently available only from one manufacturer. Mike Thibault made a motion to include a new section in Annex for "VFI Protection" which was seconded by Gael Kennedy. Rhett Chrysler asked for a clarification concerning if the VFI section would be describing external or internal VFIs. Steve Shull clarified that the VFIs we were discussing would be internal. Rhett Chrysler made a friendly amendment to the motion to add "Internal" before "VFI Protection". Mike Thibault accepted the friendly amendment. The motion failed with 17 votes in opposition and 3 in favor. All of the other members abstained.

One of the working group asked if the Overcurrent Protection table in A.3 should be shown in order of commonality of use. Steve Shull proposed a statement at end of Section A.3 to state that there would not be any preference in their listing. After seeing

this statement, Tom Callsen made a motion to accept it as written. This was seconded by Gael Kennedy. Jerry Murphy proposed a friendly amendment to modify wording to "The order of listing in Table A.1 does not represent any preference nor is this a complete list." Tom Callsen accepted the friendly amendment to the original wording. The motion was approved unanimously. Carlos Gaytan made a motion, seconded by Jerry Murphy, to change wording from "…transformer cabinet…" to "…transformer compartment…". The motion passed unanimously. Gary King made a motion to change wording from "External accessible fuse points *will*…" to "External accessible fuse points *may*…" which was seconded by Jeremy Van Horn. During the discussion of this motion, one of the working group commented on the placement of the "F1, F2, and F3" labels. This was discussed based on nameplate marking as well as customer requirements. One user stated that his company would require the labels for "F1, F2, and F3" as marked on the nameplate. A manufacturer stated that most of transformers supplied by his company are not required by the users to provide with these. There was some discussion for and again these marking labels using these arguments. The motion was called to question and the motion failed.

Rhett Chrysler made a motion, seconded by Alex Macias, to separate the labels area of the current Section A.3.1 into a different section and call this section "LABELING". One user shared what IEC stated about labeling. The motion passed with 3 abstentions. Steve Shull separated Section A.3.1 and renamed it, "Labeling" in the draft.

Following this same example, he separated the later part of Section A.3.1 to "Accessibility and Operational Considerations" as agreed to by the working group.

As we were running out of time, Steve Shull asked for general comments on any hot issues in the Annex. One person offered a comment concerning the content in Annex A as it seemed to be too specific and maybe it should be more general.

The next meeting of the Working Group will be in the Spring 2019 Anaheim meeting.

Being out of time, Steve Shull adjourned the meeting at approximately 4:30 pm.

Submitted by: Scott Dahlke

[redacted]C57.12.36 – Distribution Substation Transformers – Jerry Murphy

This working group did not meet.

[redacted]C57.12.38 – Single-Phase Pad-Mounted Transformers – Ali Ghafourian

Ali Ghafourian presented the following minutes from the working group meeting on October 15, 2018 at 1:45 p.m. with 72 in attendance.

The meeting was called to order at 1:45 p.m. by Ali Ghafourian.

A quorum was established with 25 of 39 working group members present.

The agenda for the meeting was presented, a motion from Fred Friend and seconded by Jerry Murphy to approve the agenda and it was unanimously approved.

The minutes of the Spring 2018 meeting in Pittsburgh was presented by Carlos Gaytan and seconded by Ed Smith to approve the minutes and it was unanimously approved.

It was stated that our PAR expires in 2022.

Old Business:

1. TF on adding Internal Components to an Informative Annex

   Giuseppe Termini gave a report and showed a list of components that were being proposed for the 3PH standard (12.34) be considered for inclusion in this 1PH standard. A suggestion was made to include pictures of the components for clarity, but it was decided to delay this recommendation to see what was going to be added to the 3PH standard. There was a motion made by Carlos Gaytan and seconded by Steve Shull to use the 3PH list in the 1PH standard. After some discussion it was decided to add "as applicable to 1PH transformers" in the motion because things like auxiliary contacts should not be used on 1PH. The amended motion was unanimously approved.

2. TF on updating the drawings that seemed to be "not to scale". The new drawings will be posted on the website for review.

New Business:

Ali requested as Task Force be developed of three persons to clean up the document and perhaps reorganize the document in view of the new 12.39 Standard for Distribution Transformer Tank Pressure Coordination.

The volunteers were: Jeremy VanHorn, Carlos Gaytan and Jerrod Prince

A total of 14 persons requested membership.

The Chair adjourned the meeting at approximately 2:45 pm.

Submitted by: Alan Wilks

[redacted]C57.12.39 – Tank Pressure Coordination – Carlos Gaytan

Carlos Gaytan presented the following minutes from the working group meeting on October 15, 2018 at 4:45 p.m. with 31 in attendance.

The meeting was called to order at 4:46 PM. Introductions were made. Carlos Gaytan called the question for essential patent statements and responses, none were raised.

Quorum was checked. The working group consisted of 26 members, requiring 13 for quorum. 7 members were confirmed at the time of counting, so quorum was not established. 11 members were confirmed afterwards through the roster.

Neither the agenda, nor the minutes from the previous meeting could be approved since quorum had not been established.

Old business: Carlos presented the chair report. The C57.12.39-2017 standard was published on May 4, 2018. The 10-year cycle ends on Dec. 31, 2027; the latest start year for a revision to meet this deadline is 2022.

New business: Carlos presented a list of possible items for consideration into the next revision of the standard:

1. Add requirements for negative pressures
2. Clarify applicability of standard for submersible transformers

3. Changes on requirements for Design Tests for Fault current capability
4. Temperature requirements

Carlos presented a new potential scope and asked the group when the next revision process should be started. A discussion followed:
Multiple other standards such as C57.12.20 are currently working to align with C57.12.39 in their active revisions. Since the 2017 publication of C57.12.39 doesn't cover negative pressure requirements, those other documents are considering their adoption.

Steve Shull commented that it would be beneficial for the other standards if C57.12.39 could be accelerated and published before the other standards were updated, but that it would not be possible due to the time required for the PAR approval process. The consensus was to gather comments while updating the other documents and postpone a new C57.12.39 PAR for 3-4 years. No formal decision was made to postpone the PAR, since quorum had not been established.

Jerry Murphy also commented about the definitions of the terms "nominal" and "rapid transient". Carlos commented that they were defined in the document. Jerry mentioned that nominal pressures should include both high and low ambient pressures since transformers can deform due to negative pressures as well as positive. This would be one of the items considered for the next revision of the standard.

The WG will not meet in the Spring 2019 meeting in Anaheim. The meeting was adjourned at 5:15 PM.

Submitted by: C. Gaytan/J. Van Horn

[redacted]Task Force on Transformer Efficiency and Loss Evaluation – Phil Hopkinson

Phil presented the following minutes from the task force meeting on October 15, 2018 at 9:30 a.m. with 97 in attendance.

The minutes shall record the essential business of the Working Group, including the following items at a minimum:

1. Call to order and any Chair's remarks

   9:37am meeting was called to order

2. Quorum Verification

   Not a working group; Quorum is not necessary

3. Confirmation of the essential patent statement and responses

   Not a working group, no patents were discussed.

4. Approval of minutes of the previous meeting

   First – Steve Shull

   Second – Alan Wilkes

   Minutes approved.

5. Approval of agenda for this meeting.

   Agenda was posted and followed for this meeting.

6. Technical topics

   Dan Mulkey presented loading Data submitted by Toronto Hydro and Duke Energy. Shown below are some of the highlights:

   Toronto Hydro
   3,254 single-phase transformers, all serving residential load
   100kVA was their most common transformer size (1,236 of 3,254)
   # of customers/transformer – Most common is 12 cust/transformer (range 1-30)
   Annual Load Factor – 0.29 average was the mode (most common)
   Peak Load (Mode): 3.8kW/customer
   Average Load (Mode): 1.1kW/customer
   kW/Nameplate kVA (Mode): 0.9 – Range is 0-5.8

   Duke Energy:
   12 transformers – 10 OH and 2 UG serving residential and commercial load
   25kVA was their most common transformer size (7 of 12)
   # of customers/transformer – Most common is 3 cust/transformer (range 1-8)
   Annual Load Factor – 0.20 average (0.30 RMS) was the mode (most common)
   kW/Nameplate kVA (Mode): 0.7 – Range is 0-2.0pu

   Dan's analysis goes into much more detail. For a detailed look into these values, this presentation is posted on the IEEE website.

   Tom Callsen stated to the task force that utilities submitting data need to alert Dan if there is a situation where their company doesn't install a certain size transformer and automatically default to something bigger (i.e. bypassing a 37.5KVA and installing a 50kVA transformer). Tom's concern is that this will skew the data down to a lower load factor since the transformer would be oversized. Dan said that this may be the case already since utilities are required to install equipment to meet voltage drop requirements, which in a lot of cases make the transformer larger than what would be required to simply serve the actual kVA demand.

   A comment was made that the data being present is only a snap shot of data in time and that transformer loading may change in years to come due to things like distributed generation and EV charging.

7. Next meeting--date and location

No additional comments before adjournment. Next meeting is in Anaheim in Spring 2019.

Submitted by: Phil Hopkinson

[redacted]Task Force on Distribution Transformer Monitoring – Gary Hoffman

Gary presented the following minutes from the task force meeting on October 16, 2018 at 4:45 p.m. with 95 in attendance.

1. Call to order and any Chair's remarks – Called to Order at 4:45PM by Gary Hoffman
2. Quorum Verification – All participants we informed of the option to request membership of the Task Force by indicating in the Rosters being circulated.

3. Confirmation of the essential patent statement and responses – No patents were discussed or disclosed to the Chain or the Vice as of the submittal of these minutes
4. Approval of agenda for this meeting. No Objections Motion by Jerry Murphy, Second by Al Traut– Unanimously Approved
5. Call for WG Secretary: Post meeting, Gustavo Leal volunteered appointed by the Chair
6. Technical topics introduced by Chair followed by discussion of each
   a. Review of WG's Scope/PAR
   b. (Introduction of Suggested Clauses to the Guide – Not in order of Guide to be developed)
      i. Justification for monitoring – Discussion centered on Safety, Resiliency, Reliability
      ii. Key monitoring parameters and their tolerances
      iii. Method of alert – Audible and/or visible local alarming
      iv. Telemetry – Transmission of information to those which should then take action.
      v. Monitor enclosure integrity and user access – How the Monitoring Device Enclosure should be constructed
      vi. Installation – How the Monitoring Devices should be installed – Discussion concerning some Utility Regulatory Commissions accepting monitor Reporting in lieu of on-site inspections (Rick Cantrell).
      vii. Obligatory - Overview/Normative Reference/Definitions Clauses
7. New business
   a. Motions for establishing Task Forces for Suggested Clauses
   b. Motion to form Task Force (TF) for 6.b.i (Justification for Monitoring) development of Clause – Dan Mulkey – Made Motion – Seconded by Steve Shull Motion Passed unanimously. Dan Mulkey to Chair TF. Call for Member participants in TF.
   c. Motion to form Task Force (TF) for 6.b.ii (Key Monitoring parameters and tolerances) development of Clause – Jerry Murphy – Made Motion – Seconded by Steve Shull Motion Passed unanimously. Jerry Murphy to Chair - Call for Member participants in TF Ditto above
   d. Motion to form Task Force (TF) for 6.b.iii and iv (Method of Alert and Telemetry) development of Clause – Mike Thibault – Made Motion – Seconded by Said Hachichi Motion Passed unanimously. Mike Thibault to Chair - Call for Member participants in TF
   e. It was agreed to Table action on clause for enclosure integrity and access along with the clause on installation
   f. General – Between Fall 2018 Jacksonville and 2019 Anaheim Meeting the expectation is that these TFs formed in 7.b thru d will schedule via a "Doodle Poll" and meet via "Web-Conference Call) and develop a draft proposal for the working group to review and discuss at the Anaheim Meeting.
   g. Discussion of the followed concerning Utilities and Manufacturing members of the Working Group to provide short presentations at the next meeting in

Anaheim on what "State of the Art" Monitoring for Distribution Class Transformers. Volunteers for this were:

i. PSE&G – David Blew
ii. ConEdison – Bradley Kittell/Jason Attard
iii. Qualitrol – Hakim Dulac
iv. Pacific Gas and Electric –Mike Thibault
v. Dupont – Mark Scarborough

A doodle poll will be issued to decide on meeting dates prior to and just after Thanksgiving and perhaps after the New Year

8. Next face to face meeting – Anaheim, California March 24 thru 28 – 2019. A Web meeting may be called if needed
9. Adjournment

There were no Handouts for this Meeting – Attached Power Point for Meeting Agenda

Submitted by: Mike Thibault

C.3 Old Business

- None

C.4 New Business

- Steve Shull is stepping down from the position of Chair of this subcommittee. Ed Smith will be taking over as Chair. Many members of the subcommittee voiced their appreciation to Steve for his years of dedication to the Distribution Subcommittee.

C.5 Chairman's Closing Remarks and Announcements

Steve had no closing comments to the SC except to note that the next meeting would be in Anaheim in the Spring of 2019.

C.6 Adjournment

Steve adjourned the meeting as provided in the meeting agenda at 10:15am.

Annex D Dry Type Transformers Subcommittee

October 17, 2018

Jacksonville, Florida USA

Chair: **Charles Johnson**

Vice-Chair: **Casey Ballard**

Secretary: **David Stankes**

D.1 Introductions and Approval of Agenda and Minutes

Casey Ballard, Vice-Chair, led the meeting as Chuck Johnson did not attend this meeting.

The Subcommittee met on October 17, 2018 at 1:30PM in the Grand Ballroom 1 room of the Hyatt Regency Jacksonville Riverfront Hotel.

The meeting was convened with 45 people in attendance. 18 of the 22 members of the Dry Type Subcommittee were present, so quorum was reached. Six guests requested membership. The attendance roster will be recorded in the AMS.

The Chairman reviewed the proposed Agenda. A motion to approve the agenda was made by Tim Felix-May and seconded by Klaus Pointner. The agenda was approved unanimously.

The chairman noted that the unapproved minutes from spring 2018 SC meeting had been posted on the SC Transformer Committee website. A motion to approve the minutes was made by Roger Wicks and seconded by Tim Felix-Mai. The minutes were approved unanimously.

D.2 Chairs Remarks

Casey reminded group that all TF/WG/SC meeting minutes must include the attendance (including affiliation) for all future meetings. The easiest way to comply with both is to enter attendance into AMS first, and then run a AMS attendance report that can be copy and pasted into the meeting minutes.

Casey noted that among the DTSC membership we have two new main committee members: Tim-Felix Mai and David Stankes.

D.3 Working Group/Task Force Reports

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

D.3.1 Revision of IEEE PC57.12.01 - Dry Type General Requirements Chair Casey Ballard

The working group met in the Grand Ballroom 7 of Hyatt Regency Jacksonville Riverfront Hotel.

The meeting was called to order at 1:45 PM by Chairman Casey Ballard.

Chairman made opening comments.

WG Roster has been distributed and signed. Participants introduced themselves.
The meeting was convened with 39 participants, 15 of them are members. Quorum was reached (24 current members). 2 guests requested membership. The attendance will be reported in the AMS.

The Agenda was amended by R. Marek to include information on the development of short circuit thermal calculation by IEC WG MT 60076-5. Agenda with amendments was approved unanimously being no negative votes.

The Minutes of Spring 2018 Pittsburgh meeting was approved unanimously (moved by T.-F. Mai and seconded by D. Walker).

The chair made a call for known patent disclosure. No patent related issues were claimed.

- Draft 5 of the revision has been circulated prior to the meeting.
- Chair informed on the revisions that were incorporated into Draft 5 as results of the decisions made in Spring 2018 meeting:

IEEE C57-12-01 Fall 18.pptx

- Minimum nominal system voltage of 1.2 kV – now is Table 4; 0.25 and 0.6 kV classes are removed.
- Designation of the cooling classes of transformers modified in Section 5.1:
  - included wording "dry air or nitrogen" in definition of "G" class
  - included definition of the "/" symbol in relation to cooling for more than one kVA rating transformers
  - included example for ANAF class (no slash in the designation).
- Audible sound levels – cooling class modification leads to changes in sound tables in 5.10.3.6.
- Partial discharge in 5.10.3.5 – removed the description of the testing process since it was moved to IEEE C57.91.
- Effect of temperature on transformer winding during short-circuit conditions in 7.8 - the emphasize to the importance of the insulation system integrity during these conditions has been included.
- Temperature limits of transformers for short-circuit conditions in 7.9
  - column 1 shows Insulation System Thermal Class, comment on the insulation system temperature has been added.
  - S. Levin asked what is the correct term for the temperature in the column 1 of Table 14: Temperature Class or Thermal Class (as in liquid-immersed transformers). The review of terminology used in this standard and other documents (C57.96, C12.60, C12.80) will be done to determine the proper term.
  - D. Walker noticed that it's better to use a singular form for a "Conductor" in the last column of Table 14.

Old business

- Impedance value ranges in 5.8 (Juan Medina) – no ranges, but to be defined by each manufacturer or, more importantly, by the customer itself.
  - Current text - Standard values of impedance are included in the product standards for particular types of transformers.

The only product standard that will still have impedance ranges after we complete the combination and revision of IEEE C57.12.50 and IEEE C57.12.51 will be IEEE C57.12.52 (Sealed Dry-Type).

- P. Hopkinson proposed to include a minimum impedance based on the coordination with breaker capabilities.
- Proposed text - The Impedance rating shall be specified to the manufacturer for each particular transformer. If there is no Impedance rating specified or available, the OEM's will follow their internal design and manufacturing standard processes to design and build a particular transformer. Due to the different design and building practices, the resulting IZ's when not specified, could vary from one OEM to the other.

Alternative text: the impedance rating shall be specified. If none is provided, then the OEM's standard rating may apply.

After a discussion, the motion to accept the Alternative text above was made by D. Walker and seconded by T.-F. Mai. The motion passed unanimously.

- After additional discussion, P. Hopkinson proposed to add the following additional requirements on impedance: "4% minimum impedance should apply to all transformers that step-down medium voltage to a low voltage". This motion was seconded by J. Antweiler. The motion was rejected by the vote (2 votes were for, 12 votes – against the proposal).

- Short Circuit Thermal Calculation – R. Marek informed that WG IEC MT 60076-5 has a proposal to modify thermal calculation for the short circuit conditions; this modification makes the equation valid in all cases (the previous one wasn't correct at current densities above 230 A/mm sq). As this modification hasn't yet been adopted by IEC, the WG assigned 2 action items:
R. Marek will contact the convener of IEC WG to clarify the status; D. Walker will evaluate the applicability of the proposed modified equation.

- **PAR expires 12/31/2020**

- Discussion completed to address topics that were defined for the revision of the document and opening of the PAR.
- No major issues left open.
- Draft 6 will be sent to the WG for the review and comments to be addressed in Anaheim in spring 2019 in order to finalize the revision.
- We plan to seek SC approval for SA ballot on or before Fall 2019 meeting.

Next Spring 2019 meeting: Anaheim, CA, March 24-28, 2019.

With no further business, the meeting was adjourned at 3 PM.
Chairman: Casey Ballard

Secretary: Sasha Levin

D.3.2 Revision of IEEE PC57.12.60 - Dry Type Thermal Aging Chair Roger Wicks

The WG met on October 16, 2018 at 1:45PM in the Grand Ballroom 7 room of the Hyatt Regency Jacksonville Riverfront Hotel. The meeting was called to order at 1:45 PM by Chairman Roger Wicks. Introductions were made and attendance sheet was circulated.

The meeting was convened with 42 people in attendance. 27 guests / 15 members present. Quorum was reached. 4 guests requested membership.

The Chairman reviewed the proposed Agenda. Motion to approve the agenda was made by Mike Shannon and seconded by Joe Tedesco. The agenda was approved unanimously.

Motion to approve the minutes from Pittsburg spring 2018 meeting was made by Tim-Felix Mai and seconded by Casey Ballard. The minutes from the spring 2018 WG meeting were approved unanimously. The attendance will be reported in the AMS.

The chairman presented slides pertaining to essential patent claims (no issues were noted) and meeting guidelines.

- IEC 61857-41 Review outcome of meeting in Vienna – September 18, 2018
    - Little progress was made related to the resolution of a wide range of comments provided during the circulation of a CD3.
    - In some cases, the comments did not provide enough proposal for revision, and in other cases the information was not complete.

- The convener of the WG6 has requested the commenters to provide more detail so a working group can complete the resolution of the comments.
- C57.12.60 must move forward due to delays with 61857-41

- The chair reviewed the new draft revision of C57.12.60 and described the following changes made to the document. (The following information was included in slide presentation displayed during meeting.)
  - Inclusion of new aging table and thermal screening discussion from IEC
  - Inclusion of new dielectric screening discussion from IEC
    1. Initial Test Coil Usability Check – like IEEE C57.12.60, 4.3
    2. Pre-ageing design and construction evaluation
       - identification of the possible upper limit for thermal ageing
       - To evaluate the actual initial dielectric strength of the EIS on the test coil using operating voltage
  - Detailed discussion of dielectric testing for both models and small size coils
    1. Dielectric Testing has been further clarified in this revision, with a detailed description on how to run the test (consistent with IEEE C57.12.91).
    2. The following volunteers were identified at the meeting to improve the flow of the dielectric testing. Volunteers include Ken McKinney, Mark Raymond, Dhiru Patel and Casey Ballard
  - Discussion of PD as a trending test
    1. Chairman presented PD testing (optional) information that was submitted by Tim-Felix Mai.
    2. Chairman noted that this information will be found in the annex but may make it to the main body of the document once sufficient information has been collected.
    3. Joe Tedesco suggested that it may be a good idea to identify a threshold PD level. Casey Ballard noted that since this was a trending test, this was perhaps not needed.
  - Discussion on changes to approved systems (first draft)
    1. Chair reviewed list of materials typically referred to as Primary Insulation.
    2. Chair acknowledged that there may be strong opinions on what and how changes may be made described in the proposal, but something was needed in the document to address this subject. He expects lots of feedback.
    3. Chair described changes that may be approved using single point test including
       - Different winding constructions
       - Changes (reduction) in thickness. Mark Raymond noted that some systems may be overdesigned (too much insulation).
       - Change of build on magnet wire
       - If the original Arrhenius equation cannot be defined with the confidence interval of 0.95 or greater, then a full three-point thermal aging shall be required.
    4. Modifications to the primary insulation that involve replacement of one material vs. another material (different chemistry) will require a full three-point thermal aging.

5. Change of one supplier of a material to another supplier of enameled magnet wire is allowed if both materials meet the relevant ANSI/NEMA MW1000 magnet wire specifications.

    - Mike Shannon noted that the chemistry AND quality of the magnet wire should be validated, such as with UL approval.
    - Joe Tedesco pointed out that companies outside the US may want to use this standard, and may not have access to UL, etc. validation.
    - Mark Raymond suggested that both NEMA MW 1000 as well as IEC 60317 may be used to describe magnet wire.
    - Solomon Chiang suggested use of analytical test procedures to prove materials are chemically the same.

6. Question from Mike Iman regarding why (magnet wire) test approval on Copper will also cover Aluminum, but not vice versa. Mark Raymond explained that Al will create oxides during thermal aging, enabling the oxide coated material to attain a higher rating.
7. Mark Raymond described differences between Sealed Tube Test (CCT) and thermal aging test. He stated that UL 1562 transformer document references use of UL 1446 for changes in an EIS. Also said that CCT test has historically been used for Secondary insulations, but also is used for varnish changes. He also noted that UL 1446 allows use of either CCT OR single point test for material substitutions.
    - Chair suggested use CCT with higher temperature and extended times, possibly related to conditions used in the original system.
    - Casey Ballard. Mark Raymond and Joe Tedesco noted that data on original systems may not always be available, which would make it impossible to identify modified CCT test temperature.

- Addition of criteria on aging process minimum number of cycles and minimum time requirements for high and low temperature points.

- Path Forward
    - Chair noted that PAR expires end of next year
    - A new draft has been prepared with all the noted changes described during the meeting. He recommended moving forward with this draft, and entertained a proposal to do this.

      The following proposal was made by Casey Ballard:
        1. Draft document would be send out to the Members and Guests of the WG, requesting comments.
        2. Asked that comments be returned to the Chair by the end of November.
        3. The Chair would forward these comments to the volunteers (Casey Ballard, Tim-Felix Mai, Dhiru Patel, Roger Wicks, Dave Stankes). The volunteers would modify the draft, incorporating editorial changes received in the comments. They would not address technical comments.

4. The Chair would send out the resulting document (estimated mid December) to the WG for a Yes/No vote, requesting approval to send to SA. (Vote requires a super majority)
5. Casey will then send to subcommittee for simple majority vote.

This proposal was seconded by Tim-Felix Mai.

Some discussion regarding timing of when the various steps would take place.

Motion was unanimously approved.

As there was no more time left, the Chair thanked the WG and meeting was adjourned. Meeting was concluded at 3:03PM.

It was confirmed that the WG would meet again at the spring 2019 Transformer Committee Meeting.

Notes prepared by Dave Stankes.

Chair: Roger Wicks
Co-Chair: Dave Stankes

D.3.3 Revision of C57.12.51 – Ventilated Dry-Type Power Transformers – Casey Ballard

The working group met in the Hyatt Regency Jacksonville Riverfront Hotel, Jacksonville, FL, USA
The meeting was called to order at 11:02 AM by Chairman Sanjib Som.

Chairman made opening comments including that he had a new Vice-Chair in Casey Ballard

WG Roster was distributed for attendees to sign-in.
The meeting was convened with 15 participants, 5 of them are members. Since there are 11 members, quorum was not reached and official business was not possible to be performed. The attendance will be recorded in the AMS.

The Agenda was presented, but could not be approved due to lack of a quorum.

The Minutes of spring 2018 Pittsburgh meeting were presented, but could not be approved due to lack of a quorum.

The chair made a call for known patent issues. No patent related issues were claimed.

Old business

- No old business

New Business

There has been a PAR extension submitted by the chair

Draft 2.0 updates:

The vice chair then presented the outcome of the MEC review.

- Updated Scope to match PAR

- Updated language to match the style of a Guide instead of a Standard
    - Changing *Shall* to *May* or using *reference* instead of *requirement*
- Updated units to be metric (imperial) to match style manual
- Used new drawings that aren't so 'fuzzy'
- Updated Legal 'absolute verbiage'
    - *Prevent* to *help prevent*

It was noted that the Ballot Pool formation had ended and that the document ballot phase had begun and would continue until 11/10/2018.

Melia Zaman then assisted the vice chair in describing the process the document would follow until it is published. Since the SASB expiration date is 12/31/18, this document will become 'inactive'. It will still be available on the IEEE website until it is published. Then it will become 'active' again.

This WG does not plan to meet again under the existing PAR.

With no further business, the meeting was adjourned at 11:42 AM.

Respectfully submitted,

Chairman: Sanjib Som
Vice Chairman: Casey Ballard

D.3.4 Revision of IEEE PC57.12.91 - Standard Test Code — Chair David Walker

The Working Group met in Grand Ballroom 2 & 3. The meeting was called to order at 4:45 PM by Chairman David Walker.

Chairman made opening comments.

Introductions were made by all participants. WG Roster has been distributed and signed.

There were 28 people present. 10 out of 17 members and 18 guests were present. A quorum was present. The attendance was reported in the AMS.

The agenda was approved unanimously. Motion: Casey Ballard, Second: Jim Antweiler

The minutes of the March 2018 meeting in Pittsburgh were approved unanimously. Motion: Joe Tedesco, Second: Jim Antweiler

The patent call was given. No one replied with any patent issues.

Old Business

- The chair presented the changes from Last Meeting.
    - PD test were moved word by word from C57.12.01 to C57.12.91 (new diagram for the voltage without copyright protection from IEC)
    - Restatement of Section 11.8.3 was shown
- A proposal for Sound Level Test Revision was presented by chairman. It will be copied from C57.12.90, except the load sound level and near field correction. Motion Mike Iman, second: Dhiru Patel, approved unanimously
- An informative annex proposal for 50-60Hz Conversion was presented by chairman. The proposal is to copy the annex from C57.12.90 and adjust the wording to dry type transformer, where necessary. Motion:

Casey Ballard, second: Jim Antweiler-> after the discussion if the factors for noload correction are the same for dry and oil transformer the motion was tabled, motion: Casey Ballard, second: Jim Antweiler

- The decision was that manufacturers should send their noload correction data to Casey Ballard, he will collect the data to see if they will match the proposed annex. The 50-60Hz conversion with the correct factors will be discussed in the next meeting

- A proposal for Thermal Test Resistance Measurement Location (prepared by Jim Antweiler and Rhea Montpool) was presented by the chairman
  - The proposal was that the temperature rise should be measured at the leads not at the terminals
  - Discussion if this should be hard (shall) or soft (feasible) requirement. Consensus to be hard requirement but it should be possible to do it at the terminals if there's an agreement with the customer.
  - Decision that hot and cold resistance should be measured at the same place
  - A note should be added at the end of section 5.2.1 that the cold resistance might be different from the coil's resistance for the losses
  - Section 5.2.1 Resistance, 11.4 Resistance measurements and 11.5 Hot-resistance measurement must be updated
  - Motion: Jim Antweiler Second: Casey Ballard, approved unanimously
- Discussion about the right usage of the word secondary and low voltage winding Motion to table the discussion: Motion and second by Joe Tedesco / Jim Antweiler. Passed unanimously.
  - The chair will check for consistent wording in the section

New Business:

- C57.12.90 is looking at short circuit testing. This WG will monitor the results of the C57.12.90 TF. As C57.12.91 wants to stay synchronized with C57.12.01. It was decided to leave short circuit test as it is in this revision. Motion and second by Casey Ballard / Jim Antweiler. Passed unanimously.
  - The short circuit test will be reviewed in the next revision and aligned with changes in C57.12.90
- Final remarks from the chairman:
  - Goal- stay synchronized with C57.12.01 revision cycle.
  - Freeze changes after issues discussed in Fall 2018 meeting.
  - WG vote on draft in Spring 2019 meeting
  - Create Comment Resolution Group in Spring 2019.
  - Submit draft to MEC to start ballot process.

With no further business, the meeting was adjourned, without objection, at 6:00 PM.

The Working Group will meet again at the spring 2019 meeting in Anaheim, CA, March 24-28.

Chairman: David Walker

Vice Chairman: Tim-Felix Mai (acting as Secretary)

D.3.5 IEEE PC57.16 – Dry Type Reactors Chair Art Del Rio

The working group for the revision of C57.16 met in the Grand Ballroom 6 of the Hyatt Regency Jacksonville Riverfront Hotel on Monday October 15, 2018, at 9:30 AM.

1. Introductions and Call for Patents

- The meeting was called to order at 9:30 AM by the WG Chair Art Del Rio.
- The meeting was opened with the introduction of participants.
- The WG Chair Art Del Rio did a call for potentially essential patents. None was reported.

2. Circulation of Rosters

- The attendance rosters were circulated.

3. Verification of Quorum

- There were a total of 20 participants: 7 Members and 13 Guests out of which 3 guests requested membership; 2 were granted based on attendance.
- 7 of the current 13 WG Members were present and quorum to carry out business was met.
- The meeting agenda, which was circulated by email among members and guests on September 28, 2018, was presented to the participants.
- There were no objections or comments and the agenda was approved unanimously.

4. Approval of the minutes of the March 26, 2018, meeting in Pittsburgh, Pennsylvania.

- The minutes from the S18 meeting in Pittsburgh, which were circulated on September 28, 2018 by email, were presented to the participants.
- There were no objections or comments and the minutes were approved unanimously.

5. Continue to discuss and review of the scope, purpose and rest of the draft.

- The work has been focused on the contents of Normative Annexes.
- The WG members are requested review and suggest changes to the main clauses 3 to 12.
- Dave Caverly have found some minor adjustments. He will do a more thorough review to the next meeting.

5.a Scope and purpose

- The scope has been updated with more information about which kind of converter reactors that are covered by this standard. The general rule is that AC side converter reactors without significant level of direct current will be covered by this standard and other converter reactors will be covered by IEEE 1277.
- References to the new Annex on converter reactor applications have been added.
- Comments were given that we should clarify that this standard covers converter standards both for HVDC and STATCOM.
- Pierre Riffon and Klaus Pointner will review and give proposals to changes.
- The scope should cover reactor in series with DC capacitor for STATCOM. The operating current is at rated current during operation and therefore the temperature limits should be lower than for other series reactors. We will refer to IEEE C57.21 (Shunt Reactors as for filter reactors in Annex A.

5.b Update on proposed on 2-level, 3-level, multi-level converter reactors. Ulf Radbrandt

- Ulf Radbrandt has transferred his proposal to explanation of the differences between 2-level, 3-level and multi-level converters to a new informative Annex in the draft of the standard.
- We should add information about STATCOM also.
- We should not copy this annex to IEEE 1277 because we don't want to have the same text in two standards. It is probably better that IEEE 1277 refer to this Annex.
- One question is if this Annex will be normative or informative. As written now, the Annex does only include information and no requirements therefore should it be informative.

- A proposal is to add possible test on stray capacitance. Since this is important for other type of reactors, e.g. PLC/RI filter reactors, this should be handled in the main part of the standard. The test of stray capacitance should be performed if specified by the purchaser.

5.c Annex B - Dry-type air-core shunt capacitor reactors. Update on Technical Report 16, short term ratings, Dave Caverly

- Short term ratings should be as clear as in IEC.
- We should make an informative Annex with explanation of different applications and some basic formulas.
- When the work with the standard is ready then we should make a tutorial on this topic.
- We should cooperate with the switchgear committee in order to avoid the trouble we had during the last revision of this document. Then we added a lot of information related to TRV issues on breakers when adding current limiting reactors and later we had to remove most of it after negative votes from switchgear committee members. Dave Caverly is also participating in the switchgear committee and will try to establish cooperation.

5.d Annex A - Filter reactors. Sound section update, Klaus Pointner

- Christoph Ploetner has given inputs to clause 11.8 Audible sound level test. This proposal is ready to be included into the draft of the standard.
- We cannot refer to IEEE C57.12.90 regarding sound measurement because that standard is not updated with the latest methods that we want to use for this standard. IEC 60076-10 will be referred to instead.
- The minimum clearance distance to the reactor should be clearly stated.
- We need to limit the number of measurements, e.g. by limiting the number of harmonics.
- Klaus will send the updated section to Art Del Rio.

5.f Annex F - System considerations, TRV update based on meeting minutes. SWG committee follow up. Monty Goulkhah

- Monty Goulkhah gave a presentation regarding TRV considerations for different applications.
- Monty Goulkhah has also done a draft Annex on TRV considerations.
- Pierre Riffon suggested that we should refer to the guide IEC 62271-306.
- We should avoid to include a lot of information regarding how to do system studies. That could lead to negative votes from the switchgear committee. We should consider if we can refer to other documents for more information, e.g. by switchgear committee.

6. New Business

- There were no new business. Next meeting will take place in Anaheim, California, March 24-28, 2019.

7. Adjournment

- The meeting was adjourned at 10:49 AM.

Respectfully submitted,
Chairman: Art Del Rio (a.delrio@ieee.org)

Secretary: Ulf Radbrandt (ulf.radbrandt@ieee.org)

D.3.6 IEEE PC57.124 – Dry Type Partial Discharge Guide Chair **Tom Prevost**

Unapproved Minutes of Meeting
WG C.57.124 Dry Type PD Detection
October 16, 2018
Grand Ballroom 1 (2)
Hyatt Regency Hotel
8:00 am - 9:15 am

Meeting was called to order by Chair Tom Prevost at 8:0 am. Introduction of members took place. Quorum was recorded at 61% @ 8:10 am with total 47 attendees; 17 members and 30 guests. Three guests requested membership to the WG.
Agenda of this meeting was approved unanimously. Moved by D. Gross and seconded by Tim Felix Mai.
Meeting Minutes of Spring Meeting in Pittsburgh were approved unanimously. Moved by Casey Ballard and seconded by D. Gross.
Essential Patent claims were mentioned by the Chair none were recorded that affected work of this WG.
It was emphasized that the work of this WG would be focused on the Factory aspects of PD detection in Dry Type Transformers. Much discussion was aimed at wide band and narrow band aspects by R Kuppuswamy and D. Gross. Scope of the WG was already approved and would be kept in mind in all further discussions.

Progress on the write-up of revisions were further discussed by:

1) Normative and References, Definitions etc Casey Ballard; which covered Introduction, References and Definitions. All of which would be expanded on completion of the document.
2) PD detection Systems and Test Procedure D. Gross; which covered close working with IEC 60270 and WG C. 57.113. IEC 60270 is being revised, as is C57.113. Chair introduced concept of a task force with members of C57.113 revision to assure that we stay in synch with each other as well as IEC 60270

Other aspects will be discussed in the near future with an eye on the hard date of completion by or before 2021.
Meeting was adjourned at 9:15 am

Respectfully Submitted
Hemchandra Shertukde
Secretary WG C.57.124

D.4 Old Business

D.4.1 IEEE 259 Administrative Withdrawal

- The Vice Chair noted that the motion to (administratively) withdraw IEEE 259 had previously passed with 16 votes affirmative (unanimous). The 'administratively" was added based on a conversation with Jim Graham and Malia Zaman in which they said we

do want to let it "expire" instead of withdraw. The withdrawal process is only used if the document is not technically correct and requires PAR and ballot pool in SA. The document also wouldn't be available for purchase if withdrawn. The administrative withdrawal (expiration) is a gentler resolution as the standard is still available for purchase and could be brought back to life if we chose to in the future with a PAR.

- With that last thought in mind… Casey Ballard commented that he had studied the IEEE 259 standard and found that it contained very useful information, and asked that we reconsider the administrative withdrawal of this document. Roger Wicks noted that there were some differences between the IEEE 259 and other systems related documents (such as 40,000 vs, 20,000 reference hours). Discussion regarding merits of reversing the administrative withdrawal ensued. Joe Tedesco proposed a motion to "reverse the decision to let IEEE 259 be "administratively Withdrawn". As the PAR had expired on this document, Joe Tedesco then offered a "friendly amendment" to his motion, requesting that the PAR for IEEE 259 be opened. Jerry Murphy then offered an additional "friendly amendment" requesting that a Task Force also be formed. Resulting proposal by Joe Tedesco was to "reverse the decision to let IEEE 259 be "administratively Withdrawn", open a PAR to revise this document, and form a TF to begin work on this project." The motion passed with 11 for, 1 against and 2 abstentions. Dave Stankes volunteered as Chair and Joe Tedesco as Vice Chair.

D.4.2 **Status of Standards**

- The Vice Chair noted that the list of active standards along with noted board submission deadlines was available online for review.
- Vice Chair noted the need to begin work on C57.12.52 (Sealed Type Transformer) as this document has a 2022 expiration date. Joe Tedesco volunteered as Chair and David Walker as Secretary for this document revision. Vice Chair asked that a formal request for a meeting time slot be submitted to Jerry Murphy.

D.5 New Business

- Tim-Felix Mai made proposal that SC address transformers that have coils and core exposed to the elements (no enclosure). The group discussed whether this be addressed in a new document or annex to a current document such as C57.12.01. Casey Ballard requested that Tim send a formal proposal and that Casey would then bring this to the main committee to determine where this work should fall.

D.6 Adjournment

With no further business, the meeting was adjourned at 2:42 PM.

Chairman: Charles Johnson

Vice Chairman: Casey Ballard

Secretary: David Stankes

(Notes prepared by Dave Stankes)

Annex E HVDC Converter Transformers and Smoothing Reactors Subcommittee

October 15, 2018, 3.15 pm
Jacksonville, Florida, USA

Chair: Michael Sharp
Vice Chair: Les Recksiedler
Secretary: Ulf Radbrandt

E.1 Introduction / Attendance

Introductions were made and the attendance list circulated.

There were 7 members and 14 guests present. One new request for membership was received.

The total membership of the SC is 16. We needed at least a total of 8 members to be present in order to have a quorum. This was not achieved.

The agenda for this meeting was preliminary approved. It will be circulated among SC members via email for a final approval.

E.2 Approval of the minutes of the March 26, 2018 meeting in Pittsburgh

The minutes from the Pittsburgh meeting were preliminary approved. It will be circulated among SC members via email for a final approval.

E.3 Brief report on the meeting of the Administrative SC by Mike Sharp

All consultants shall identify who are sponsoring their attendance at the meeting.

SC minutes must be submitted latest November 29.

Submission deadline for the last standards board meeting in 2019 is September 17.

The Policies and Procedures document for the Transformers Committee has been revised to include a section stipulating a maximum five year term for subcommittee leadership.

SC chairs must ensure that their web pages are kept updated.

E.4 Reminder that IEEE 1277 will expire in 2020.

The standard for smoothing reactors, IEEE 1277, will expire in 2020.

E.5 Brief report regarding the CIGRE general meeting in Paris 2018

Klaus Pointner provided a brief report regarding the CIGRE general meeting in Paris 2018 incl. SC B4. Main topics from that presentations were:

- The objective for CIGRE is not to write standards but to solve problems that are not mature for standards yet.
- CIGRE provides inputs that can be used for standards
- CIGRE aims to also go into Medium Voltage

- Main topics this year were
  - super grids
  - smart grids
  - environment and sustainability
  - thermal design of transformers
  - 800kV VSC in China
  - DC networks
  - EU project PROMOTION for DC breakers

- At each meeting there is a large state of the art technical exhibition

E.6 Working Group Reports

E.6.1 WG IEEE P1277 - Dry-Type and Oil-Immersed Smoothing Reactors and Dry-Type Converter Reactors

Chair: Klaus Pointner (klaus.pointner@ieee.org)
Vice-Chair: -
Secretary: Ulf Radbrandt (temporary)

E.6.1.1 Introductions and Call for Patents

This WG meeting was conducted as part of the HVDC SC meeting.

The WG has different membership than the SC and different rosters. The WG roasters were distributed.

There were 8 members and 14 guests present. 1 new request for membership was received.

The total membership of the WG is 17. We needed at least a total of 9 members to be present in order to have a quorum. This was not achieved.

The agenda for this meeting was preliminary approved. It will be circulated among WG members via email for a final approval.

The minutes from the Pittsburgh meeting were preliminary approved. It will be circulated among WG members via email for a final approval.

E.6.1.2 Survey of Annexes.

The chair, Klaus Pointner did, prior to the meeting, a survey on what to do with the existing Annexes.

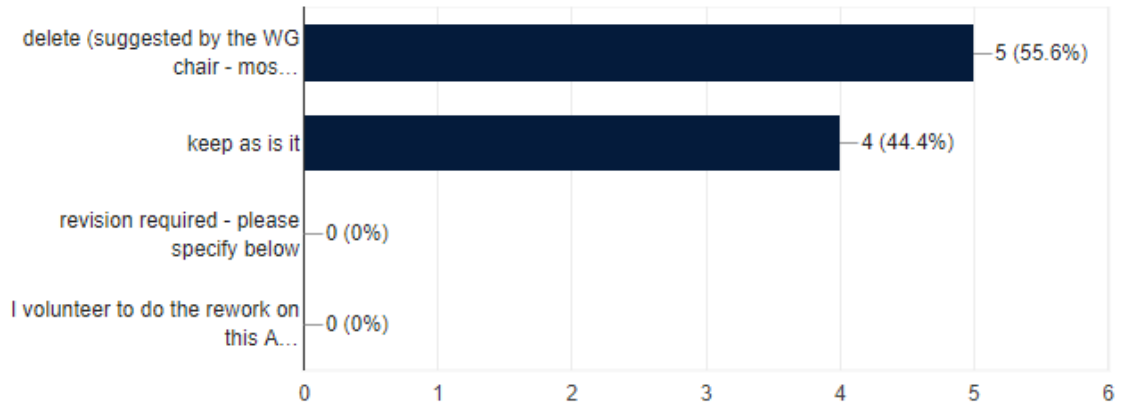
9 members (excl. the WG chair) responded.

Annex A - Application of HVDC smoothing reactors

Annex A - Application of LCC HVDC smoothing reactors - informative

Annex A

9 responses



Suggestions for improvement

2 responses

Since most of the annex relates to system design, I would agree that it is not needed.

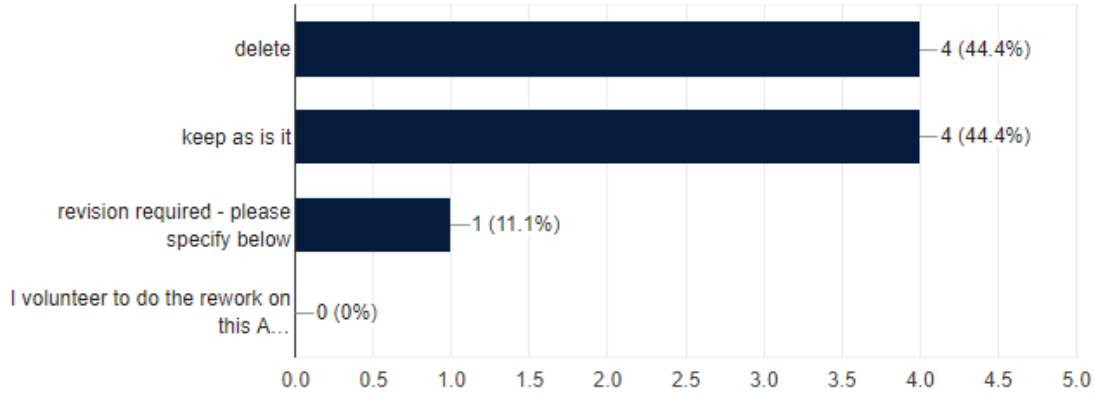
Delete but address topics of Annex A in the main text with references to suitable litarature provided under bibliography.

Preliminary decision: Delete since it mostly covers system design aspects. Klaus Pointner will check if there is something that we should keep and in that case copy it into the main text of the standard.

Annex B - Construction of oil-immersed smoothing reactors - normative

Annex B

9 responses



Suggestions for improvement

3 responses

Everything is similar to converter transformers, return the text in the main text, replace most of it by a simple reference to IEEE C57.12.00 and just keep specifities to oil-immersed smoothing reactors (like current transducers)

The information is almost entirely general and not SR specific. Only the hint in B.3.1.2 must somehow be mentioned in the standard - all other stuff is useless.

comment: so few SMR are oil immersed nowadays, perhaps not worth the effort to maintain details about construction that will likely evolve over time

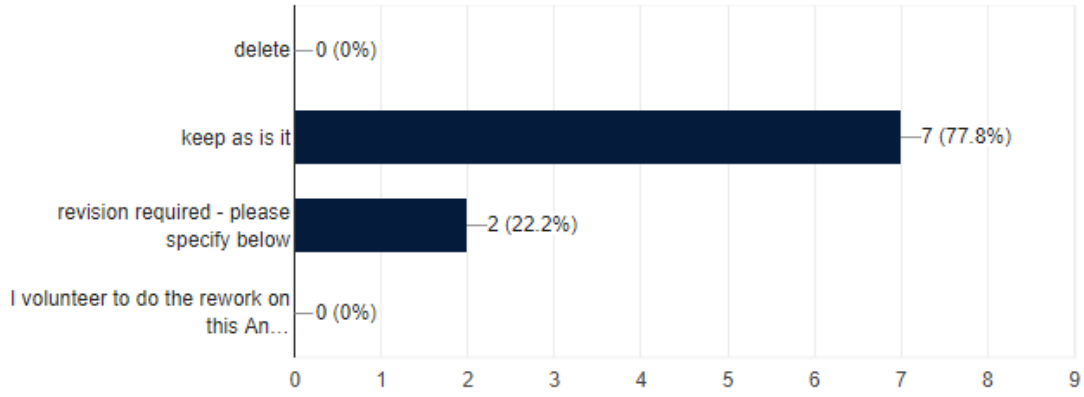
Preliminary decision: Keep. Volunteers are requested for review. Black spot issues should be addressed.

Annex C - Short-circuit capability

Annex C - Construction and installation of dry-type air-core smoothing reactors for HVDC application - informative

Annex C

9 responses



Suggestions for improvement

3 responses

The content should be reduced. It contains a lot of considerations for the system design.

As the section is not too long and most SRs are dry-type, the Annex can be kept but reviewing / improvement of the content is required.

possibly address black spot phenomena ? for discussion

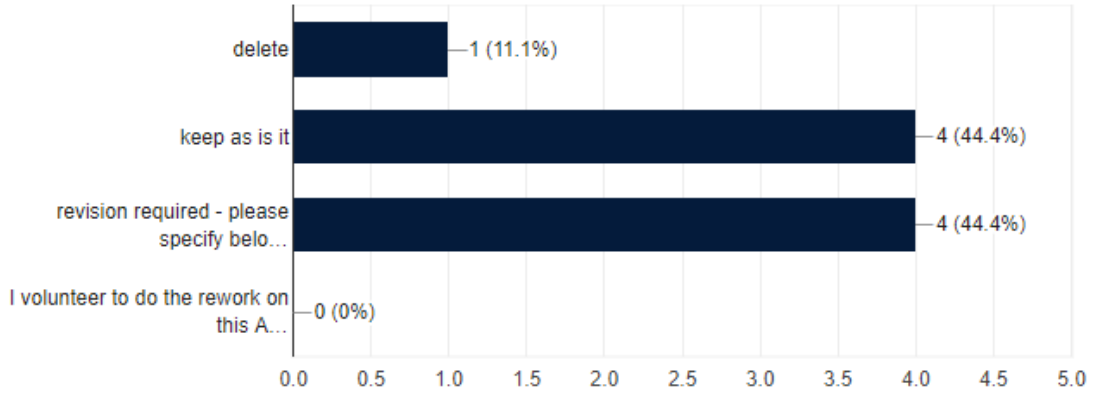
Preliminary decision: Keep but revised. Draft 5 is updated. WG members can review this Annex now.

Annex D - In-service overloading of HVDC smoothing reactors

Annex D - Short-curcuit test capability - informative

Annex D

9 responses



Suggestions for improvement

4 responses

D.2.1, 2dn para, it says "around 132000 MVA" should it be "around 13200 MVA"?
Otherwise it seems to be in good shape.

Keep it as modified in D4

I do not find D4 - sorry. An informative good Annex on SC testing is helpful to have.

minor revision as already outlined

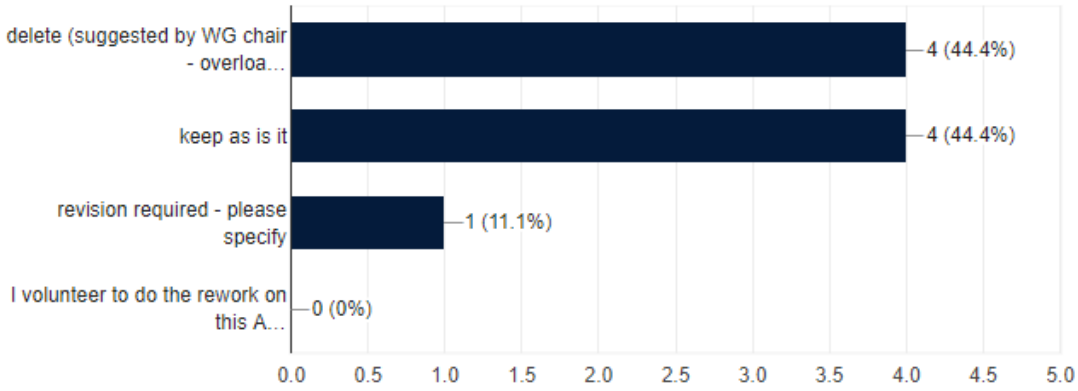
Preliminary decision: Keep but reduce the content. Overload is often a very important topic for an HVDC project. The examples are good to show end users typical kind of overloads.

Annex E - Smoothing reactors used in voltage source converters (VSC) HVDC schemes

Annex E - In-service overloading of HVDC smoothing reactors - informative

Annex E

9 responses



Suggestions for improvement

4 responses

I think that we should keep the annex but reduce it. Overload is often of very high importance in HVDC projects and should therefore be handeled in some way by the manufacturers of some main equipment, e.g. design for the overload or verify that it is ok (within the design). Perhaps we should remove equations and just keep some main topics regarding overload.

This annex gives important material and should be kept

Delete without replacement. Just mention in main text that overload conditions must be specified.

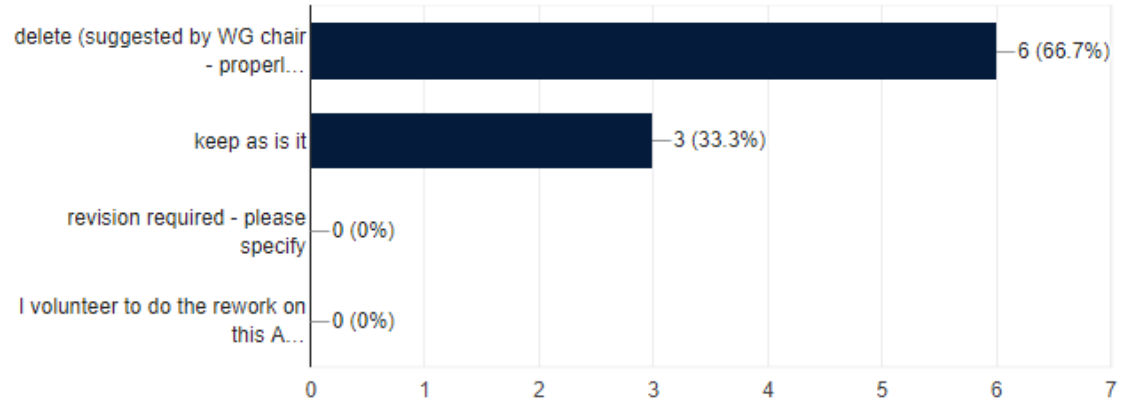
Preliminary decision: Delete. Smoothing reactors for VSC are handled in the same way as smoothing reactors for LCC.

Annex F - Smoothing reactors for 800 kV ultra high voltage direct current

Annex F - Smoothing reactors used in voltage source converters (VSC) HVDC schemes - informative

Annex F

9 responses



Suggestions for improvement

2 responses

This technology is new, keep it for the next edition. Could be deleted later.

Preliminary decision: Delete. 800kV is now an established voltage level for HVDC and the reactors are specified and tested in the same way as for reactors for lower voltages. The main text will cover ultra high voltage direct current.

E6.1.3 Discussion of Input received from Pierre Riffon, Waldemar Ziomek and Klaus Papp

Dielectric correction factors due to unusual high ambient temperatures (above 40 °C) are available in IEEE Std 4. These corrections might be covered by insulation margins according to IEC 60071-5. That information is seldom transferred to the manufacturers though. Klaus Pointner will dig into this.

A note in clause 10.5 “Temperature rise of terminals” about possible higher allowed temperatures for terminals will be deleted.

Clause 11.1.3 “Switching impulse tests” 2nd paragraph should be modified with information about difficulties to get desired wave shape.

Clause 11.3 “DC polarity-reversal test with partial discharge measurements for oil-immersed smoothing reactors” should be updated with the extended test with longer times according to the new converter transformer standard.

In the case of converter reactors that carry significant DC and AC currents a consensus was reached that AC current should be used for heat run tests since it is more severe test condition, e.g. due to heating of structural parts due to eddy currents. The current distribution is different for DC current. The current sharing and the temperature rise for DC current should be calculated and included in a design report. The heat run test should as often as possible be performed indoor because small winds can lower the temperatures with several K.

Waldemar Ziomek has investigated the need for chopped impulse tests for the reactors in this standard. He concluded that the chopped test is not necessary in modern stations with modern surge arresters. Pierre Riffon pointed out that the test still can be valid if the surge arresters are not located very close to the reactor and there is an earth fault along a post insulator near the reactor. Chopped impulse is now an optional test and it can remain as that.

Klaus Pointner would like to have new comments on Draft 5. The intention is to have Draft 6 ready in December and have a survey of the main text among WG members. A final draft including updated Annexes should be ready for the 2019 spring meeting.

E.6.1.3 Other

Klaus Pointner will distribute draft 6 in two versions:

- One with track changes
- One clean because that is easier to read

E.4.2.4 New Business

- There was no new business

E.4.2.5. Adjournment

The WG meeting was adjourned and the SC chair, Mike Sharp, took over with the SC meeting.

E.7 Old Business

- There was no old business

E.8 New Business

- There was no new business

E.9 Adjournment

The meeting was adjourned at 4:20 pm.

Annex F Instrument Transformers Subcommittee

Chair: Ross McTaggart
Vice Chair: Thomas Sizemore

F.1 Introductions

The attendees introduced themselves and reported affiliations.

F.2 Quorum

23 of 38 members were present - quorum attained.

41 guests were also in attendance and ten individuals expressed an interest in joining the ITSC.

F.3 Agenda

An agenda was displayed for this meeting. A motion to approve the agenda was made by Vladimir Khalin and this was seconded by Pierre Riffon. No objections to the agenda were raised by the floor.
.

F.4 Approval of minutes – Louisville KY and Pittsburgh, PA meetings

Both were approved at this meeting. The Louisville minutes had not been approved earlier due to a quorum not being present at the Pittsburgh meeting. Motion to approve by Vladimir Khalin and this was seconded by Pierre Riffon with no objections from the floor.

F.5 Status of C57.13 Standards

Ross briefly presented the status of the various standards handled by the ITSC:

Status of C57.13 Standards

Standard	Title	Status
C57.13	Standard Requirements for Instrument Transformers	Published 2016 rev due 12/31/2025
C57.13.2	Standard Conformance Test Procedures for Instrument Transformers	PAR exp 12/31/2021
C57.13.5	Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above	PAR exp 12/31/2020
C57.13.6	Standard for High Accuracy Instrument Transformers	reaffirmed 2010 rev due 12/31/2020
C57.13.7	Standard for Instrument Transformers with max output of 250 mA	Submitted to RevCom PAR expires 12/31/2018
C57.13.8	Standard Requirements for Station Service Voltage Transformers	PAR extended Exp 12/31/2019
C57.13.9	Standard for Power-line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers	PAR exp 12/31/2021

F.6 Working Group Reports

F.6.1 WG on Station Service Voltage Transformers - D Wallace

The meeting of the C57.13.8 Working Group met at 8:00 AM as convened by Chair David Wallace. Roster sheets were circulated for attendees to sign in.

A total of 52 people were in attendance with 22 members and 30 guests. 22 out of 32 members were present, therefore quorum was met. 6 guest requested membership.

The agenda was presented. Pierre Riffon made a motion to accept the agenda and Vladimir Khalin seconded the motion. The agenda was accepted with no objection.

The Patent Claims Statement was presented to the workgroup with no claims being identified.

The minutes from the Pittsburg meeting were presented. Igor Ziger made a motion to accept the minutes and Patrick Rock seconded the motion. The minutes were accepted by unanimous agreement.

Pierre Riffon gave a presentation on how temperature rise measurements and short circuit testing are outlined in C57.12.90 and how they should be referenced to C57.13.8. It was decided to send out a survey addressing both the Temperature rise and the Short circuit.

Temperature rise Survey will address adding the 4 methods of temperature rise measurements to the C57.13.8 and referencing the procedures in C57.12.90. The 4 methods are: Actual Loading, Back to Back, Short Circuit and Using active components.

Short Circuit Survey will address combining relative components from C57.13 and C57.12.90 to create a short circuit clause which will consist of 3 shots. 2 asymmetrical and 1 symmetrical.

<u>In old business:</u>

The results of the survey on Clause 7.3 was reviewed. Part 1 had a response ratio of 56% yes and 44% no. Part 2 had a response ratio of 67% – yes, 22% - no and 11% - abstain. It was agreed to redo the survey to keep reference to C57.12.90 and include a statement “2% and less change in impedance requires repeat of routine test, greater than 2% up to 7.5% change in impedance requires internal inspection of unit.”

David will send the survey out to the WG.

Ross McTaggart and Frank Neder will write a test procedure for temperature rise testing using a short circuit method. Comparative test results will be presented in the next meeting by way of justification.

In New Business:

In clause 1.4, Steve Snyder agreed to develop text to elaborate more in the clause.

In Clause 2 It was agreed review the normative references and update to include only those standards needed. This would be performed at the end of the draft..

In Clause 3.1.9 it was agreed to add “or largest horizontal dimension” to the end of the sentence.

In Table 4 it was agreed to add Carbon Dioxide

Due to the amount of work left on the standard, it was decided to check into holding an offsite meeting or conference meeting before the Spring meeting. David will send out a survey to determine what will be the best option and date to hold the meeting.

The meeting was adjourned at 9:15 am.

The next meeting will be at the Spring Transformers Committee meeting in Anaheim, Ca March 24 – 28, 2019.

F.6.2 WG PD in Bushings & PTs/CTs PC57.160 - Thang Hochanh

This working group did not meet as the Guide is now out for balloting

F.6.4 Working Group on Revision of C57.13.5 "Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above.

The WG met on October 16, 2018, from 9:30 am to 10:45 am. Twenty-two (22) members and twenty-one (21) guests attended the meeting. Six (6) guests requested membership. The meeting was chaired by Pierre Riffon, WG chair. Mr. David Wallace was the vice-chair.

This was the sixth WG meeting.

Attendance has been recorded in the AM system.

Required quorum was met, presence of at least 18 members was required.

The agenda has been reviewed and was approved unanimously. The motion of approving the agenda was made by Deepak Kumaria and was seconded by Thomas Sizemore.

Minutes of the Pittsburgh meeting minutes have been approved by all members present. The motion of approving the Pittsburgh meeting minutes has been made by Deepak Kumaria and was seconded by Arnaud Martig.

Call for patents has been made and no essential patent claims have been reported.

The first item of business, was related to the review and the discussion on the comments received on D1.6 Twenty-five comments have been received. The main decisions made on the comments received were:

- A paragraph regarding the need of density switches having at least two alarm levels for gas-insulated instrument transformers will be added;
- A paragraph regarding pressure test on gas-filled enclosures will be added. References to CSA and CENELEC standards will be made;
- The definition regarding rated arc proof current will be move after the definitions related to arc proof performance;
- The IEC R10 series will be given as preferred values for rated arc proof current;
- Internal arc classes I and II will be kept since these classes are also used in other IEEE and IEC documents;
- RIV test levels will be kept as 1,1 x $U_m / \sqrt{3}$ (same level as required by IEC);
- The BIL value of 950 kV for 230 kV system voltage will be changed to 900 kV. The chopped-wave and power frequency levels will be adapted accordingly;
- Partial discharge test levels shown in Table 1 and Table 4 will be clarified and probably put in a single Table.

The Chair will issue a D1.7 based on the decisions taken during the meeting. Comments to D1.7 will be required before the next meeting in order to be discussed at the next meeting in Anaheim, CA on March 26. 2019. The Chair is hoping that this will be the last round of comments before issuing the Draft for Sponsor Ballot.

A PAR extension will be required because it does not seem to have enough time to complete the document before the end of the PAR which is December 31, 2020.

The meeting ran out of time and the meeting adjourned at 10:45 am on October 16, 2018. The adjournment motion was made by Deepak Kumaria and was seconded by Thomas Sizemore.

The next meeting is planned to be held in Anaheim, California, USA, on March 26, 2019.

F.6.5 C57.13.9 Working Group for PLC Capacitors and CCVT's – Zoltan Roman

Zoltan Roman started the meeting as Chair with Mike Craven as Secretary. Introductions were made.

This is the fourth meeting as a Working Group. There were 39 attendees including 16 members and 8 requests for membership. We had a quorum of 61.5%. Membership review will be made after the meeting. The Agenda was approved.
The patent notice was made and there were no patent claims by attendees.
The Minutes from both the Fall 2017 meeting in Louisville and the Spring 2018 meeting in Pittsburgh were approved with no corrections by unanimous consent. The Agenda was reviewed.
Zoltan started Old Business by reviewing the results of surveys sent out since the last meeting:
Survey question 1 was whether to revise insulation levels in Table 5 to values from C57.13 Standard Requirements. Neither the approving not dissenting survey votes had a definitive reason for their recommendations. Zoltan is requesting a basis for the voltages and will go to the Substations Committee for an independent opinion.
Survey question 2 was whether to accept new Table 7 proposed PD extinction voltages. The survey results were split (6) NO to (6) YES with counter proposals and yielded much discussion about the basis of the numbers. After a poll of members it was decided to go with the proposed values.
Survey question 3 was whether the electro-magnetic unit of a CCVT could be disconnected during testing. After much discussion it was decided yes, but to be tested at a 5% higher than the proportional test voltage.
The last Old Business item was to add RIV Table 9, a Draft 3 revision. A poll had 8 accepting new table and PD levels and (2) to delete the requirement of RIV test below 115 kV.
New Business was to continue with Draft 4 edits. For section 7.1.1 Ross will provide the original document to add Table 10 burdens and impedances. For section 7.1.2 the transient response burdens will have the same VA values as the accuracy class burdens and the thermal burden ratings should be at 85% to allow margin for saturation or gap operation. A guest has offered to send comments and questions for further discussion of the thermal ratings.

Date and place of the next meeting will be the Transformers Committee Meeting in Anaheim California, Spring 2019. Barrett moved to adjourn at 12:15.

F.6.6 C57.13.2 Working Group for Conformance Test Procedures – Thomas Sizemore

Attendees: 43 people attended, 19 members were present and 14 individuals requested membership which will be reviewed.
Rosters: A roster was circulated for members and guests.
Essential Patent Claims: Text was displayed and the Chair inquired as to if anyone knew of essential patent claims. None were brought up.
Minutes and Agenda: Minutes from the previous meeting and the agenda were approved. The first motion was by David Wallace and second by Igor Ziger.
Review of the current version of the standard:
Based on the meeting that took place in Jacksonville the comments were reviewed.

- Proposed text was presented for Section 7.5 Mechanical Rating Test. This text was approved as it was written and these changes will be in the coming draft.
- Proposed text was presented for Section 8 which was approved as it was written and it will be in the coming draft.

- Section 9, David Wallace commented we should verify, which the, certified agencies are as per the IEEE (who are authorized to certify the equipment). Marek Kornowski commented that we should not list any specify company name in the standard. Once text changes are worked on between Igor and Thomas as survey will be sent out for comment.
- Marek Kornowski commented we should insert table 4 (list the routine test) in section 4.7 from the main standard.
- Survey to be sent in regards to the temperature rise test(whether to include it in this standard or just to do a reference to the main standard)

Motion to adjourn: A motion was put forth by David Wallace and second by Marek Kornowski
Next Meeting: This WG will meet to continue work at the spring 2019 meeting in Anaheim, California.
Next version of draft: A new draft is being prepared to update based on comments. It will be issue between meetings with a request for comments. Results of the surveys referenced above will also be presented to the working group.

F.7 New Business

F7.1 Task Force on Instrument Transformer Accuracy Requirements

As a result of the survey results and since there was no objection from the floor, discussions and actions to initiate a Task Force to review accuracy requirements have begun. Igor Ziger will be Chair of this TF. The TF will meet at the S19 Meeting

F7.2 Report from PSIM

Thomas Sizemore led a short discussion on work being done under PSIM covering a sensor accuracy test methods guide being developed.

F7.3 Corrigendum

Ross McTaggart indicated that a corrigendum is needed for C57.13. Two specific areas are known to need correction. First in section 11.3.1.7 the text calls for comparison of the first full wave and the last full wave. Other standards reference comparison of the first reduced full wave to the final full wave. Second a typographical error is present in section 4.1.1 with the use of the words usual and unusual. Finally it was indicated that the definition of RCF has a discrepancy versus text provided in the metering handbook. Steve Shull will investigate historical information on this topic. Pierre Riffon suggested a 1943 paper regarding the parallelogram be reviewed. Upon review it will be determined if C57.13 requires clarification on RCF definition. Other errors may be included in this corrigendum if provided by the membership.

F7.4 C57.13.1 Field Testing of Relaying Current Transformers

Diego Robalino mentioned that an updated version of C57.13.1 which is covered by PSRC was issued without comments from our sub-committee. He requested that the ITSC be informed of future changes.

F7.4 Cigre WG A3.42: Failure analysis of recent AIS instrument transformer incidents

Zoltan Roman reported that a new effort has been taken up within Cigre regarding instrument transformer failures. This group will study failures and potential mitigation methods in a future paper.

F.8 ITSC Adjournment

The meeting concluded after a motion to adjourn by Vladimir Khalin and seconding of this motion by David Wallace.

The next meeting is planned to be held in Anaheim, California, USA, on March 27, 2019.

Annex G Insulating Fluids Subcommittee

October 17, 2018
Jacksonville, FL

Chair: David Wallach
Vice-Chair: Jerry Murphy
Secretary: Scott Reed

G.1 Introductions, Roll Call of Members for Quorum, Meeting Agenda Approval, S18 Minutes Approval, and Chair's Comments

G.1.1 Chair's Opening Remarks:

a. When balloting, the resulting document must be reviewed and approved after the Ballot Resolution is complete before recirculation.

b. Reminded that the WG and TF meeting minutes are due for submittal to the SCIF Secretary Scott Reed within 15 days of their meetings.

c. Called for patent disclosures. There were none disclosed.

G.1.2 Roll Call of SC members: (Quorum requirement: 31 minimum)

a. 35 Members signed in. Quorum was achieved.

b. 56 Guests attended, of which 3 requested or re-requested membership:.

G.1.3 Agenda Approval:

a. The agenda was approved unanimously without objection.

G.1.4 Approval of minutes from the S18 meeting in Pittsburgh, PA:

a. The minutes were approved unanimously without objection.

G.1.5 Chair's review of key SCIF Standards:

a. The chair reviewed the status of each guide of Sub-Committee Insulating Fluids and stated that while C57.111 ad C57.121 guides will expire December, 31, 2019, no new PARs will be initiated as these guides will be superseded by C57.166.

G.2 WG & TF Reports Presented at the SC Meeting

G.2.1.1 C57.104 – IEEE Guide for the Interpretation of Gases Generated in Oil – Immersed Transformer (PAR Expiration: 12/31/19)

WG Chair - Claude Beauchemin

The report of the WG Meeting was presented at the SCIF meeting by Claude Beauchemin:

a. The WG meeting had 130 attendees. Of these, 54 of 85 members were present so a quorum was achieved. One individual requested membership but since the document in a ballot, no new WG members will be accepted.

b. Draft 5.0 had a 91.8% return rate and an 88% affirmation rate. 409 comments were received and a Comment Resolution Group reviewed all of the comments. One comment was the scope did not match the PAR so the working group will correct. The recommendations of the comment resolution group were accepted in a vote of 47-1.

See ***Appendix I*** for the F18 Minutes (unapproved) of C57.104 WG Meeting as submitted.

G.2.1.2 IEEE C57.166 Consolidation of Insulating Liquids Guides (PAR Expiration: Dec 2022)

WG Chair: Tom Prevost

The report of the WG Meeting was presented at the SCIF meeting by Tom Prevost:

a. The WG meeting had 105 attendees. Of these, 27 of 35 members were present so a quorum was achieved.

b. Five Task Forces chairs each gave a status report of their respective sections. A common dilemma between the various task forces is the lack of voltage classes for various liquids so this will be an item of discussion at the next meeting.

See ***Appendix II*** for the F18 Minutes (unapproved) of C57.166 WG Meeting as submitted.

G.3 Old Business

Chairman Wallach raised the 'new' verses 'un-used' liquid distinction discussed at the SCIF S18 meeting. After review, the sub-committee decided not to take any action at this time as C57.166 will manage within the new guide.

G.4 New Business

a. Chairman Wallach announced that Clair Claborne would serve as the chair of the C57.12.80 working group to review all definition clauses in all transformer standards. The purpose is to identify terms which should be included in the terminology guide.

b. C57.12.80 met Monday, October 15, 2018 at 9:30 am in Jacksonville and needs volunteers from each of the technical subcommittees to help both review the documents under each subcommittee and offer recommendations to the terminology working group. Jimmy Rasco volunteered to assist. For those who would like to volunteer and have a meeting conflict, please contact Clair Claiborne or David Wallach to submit recommendations.

c. WG C57.104 Chair Claude Beauchemin shared his concern with the SCIF sub-committee that if the December, 2019 RevComm is cancelled, it could potentially impact the approval of the guide. C57.104 has already had PAR extensions and the PAR expires December 31, 2019. He noted that an exception may be warranted for C57.104 if the guide is not ready by September, 2019 and the December, 2019 RevComm meeting is cancelled.

G.5 Next SCIF Meeting:

March 27, 2019—Anaheim, CA

G.6 Adjournment

The motion passed unanimously.

Respectively Submitted, Scott Reed, Secretary SCIF

Unapproved Minutes from the F17 SCIF WG and TF Meetings

Appendix I – WG C57.104 Minutes

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

Tuesday, October 16, 2018

Jacksonville, Florida, USA

Minutes of WG Meeting

The meeting was called to order at 3:15 pm by Chair Claude Beauchemin. Vice-Chair Don Platts and Secretary Susan McNelly (writer of Minutes) were also present. Vice-Chair Norm Field was not present.

There were 130 total in attendance. Of these 54 of 85 members were present. A membership quorum was achieved. There were 76 guests, and 1 of those requested membership. The WG plans to meet at the Spring 2018 Transformers Committee Meeting in Anaheim, California.

The list of meeting attendees will be maintained in the AMS system. The following guests requested membership.

Israel Barrientos, GE Prolec

Since the document is in ballot, no new WG members will be accepted.

Agenda

1. Welcome & Introductions
2. Patent Call
3. Quorum Check
4. Approval of Agenda
5. Approval of Minutes from Spring 2018 Pittsburgh
6. Ballot and Ballot Resolution Group status
7. New Business
8. Adjourn

Introductions of the Chair Claude Beauchemin, Vice-Chair Don Platts, and Secretary Susan McNelly were made.

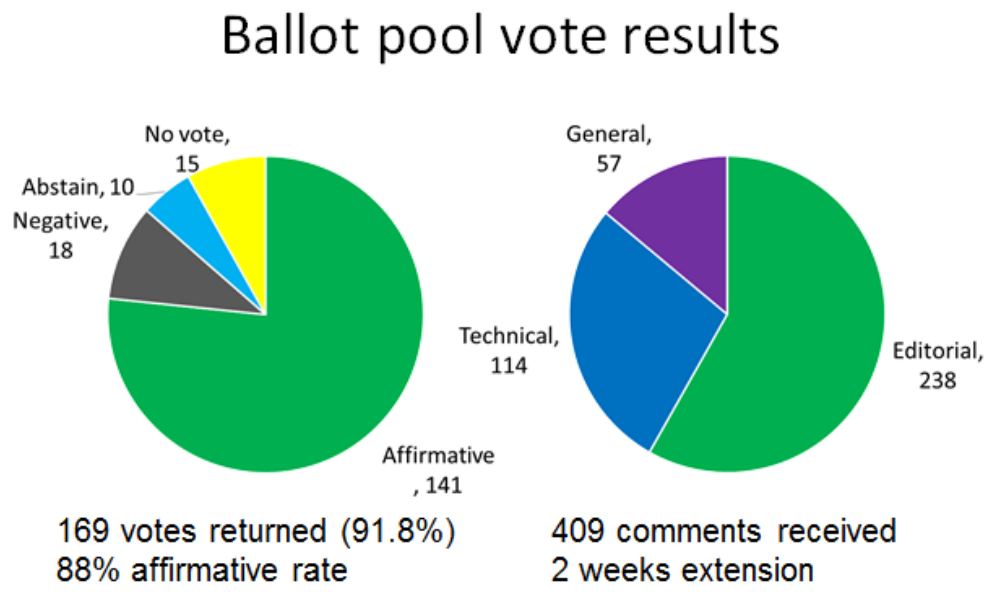
A call for essential patent claims was made. No patents were identified. It was mentioned that a patent response had been made at a previous meeting.

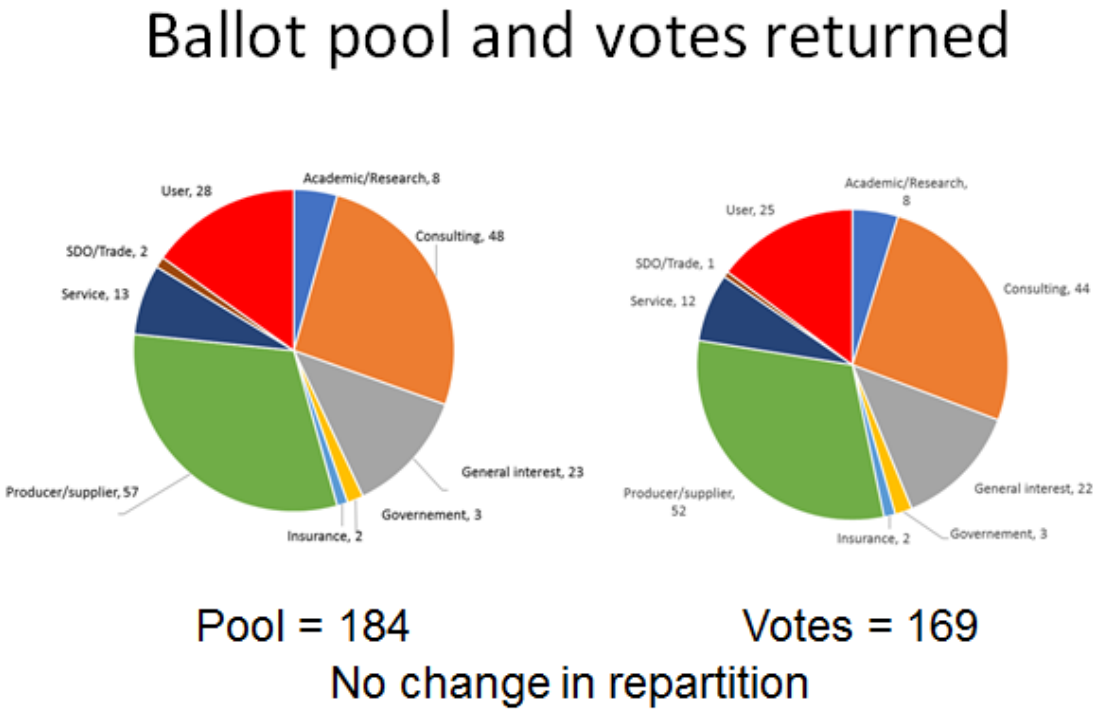
A motion to approve the Fall 2018 Jacksonville Meeting Agenda was made by Jerry Murphy and seconded by John John. There were no objections or additions to the agenda.

A motion to approve the Spring 2018 Pittsburgh Meeting Minutes was made by Jerry Murphy and seconded by Dave Wallach. There were no objections or additions to the minutes.

Ballot Draft 5.0 Status

- Ballot pool call issued in December 2017 and Ballot pool constituted (184 participants, including 32 members of the WG).
- At the spring 2018 meeting, draft 4.3 was approved unanimously and was issued to the ballot group, as draft 5.0, on April 13, 2018 for a two months ballot review





Context of ballot comments review

- The guide text and procedures have been developed over a 10 years period, with numerous presentations, WG discussions, votes and three straw ballots.

- The draft was accepted unanimously by the WG at the Spring 2018 meeting. (document considered "stable")
- Ballot affirmative rate is 88% (Consensus is defined as > 75%)
- 1 year before PAR expiration
- At this time major changes and rewriting should be passed to the next WG.

Comment Resolution Group

Don Platts	Jerry Murphy	Kumar Mani
Norm Field	Brian Sparling	Arturo Nunez
Sue McNelly	Marcos Ferreira	Tom Prevost
Dave Wallach	Jim Dukarm	Bob Rasor
Luiz Cheim	Michel Duval	Hali Moleski
Don Doris	Paul Boman	C. Beauchemin
Muhammad Ali Masood Cheema		

Comment resolution Protocol

- 60 % of comments resolved easily (essentially minor editorial and style corrections) by two reviewers.
- Ballot resolution group divided in four sub-groups (more adapted to work by conference call).
- Each remaining comments submitted independently to two sub-groups for resolution.
- Results consolidated. Contradictory results re-submitted to the other two sub-groups.
- A few residual one discussed among sub-group leaders on phone calls.

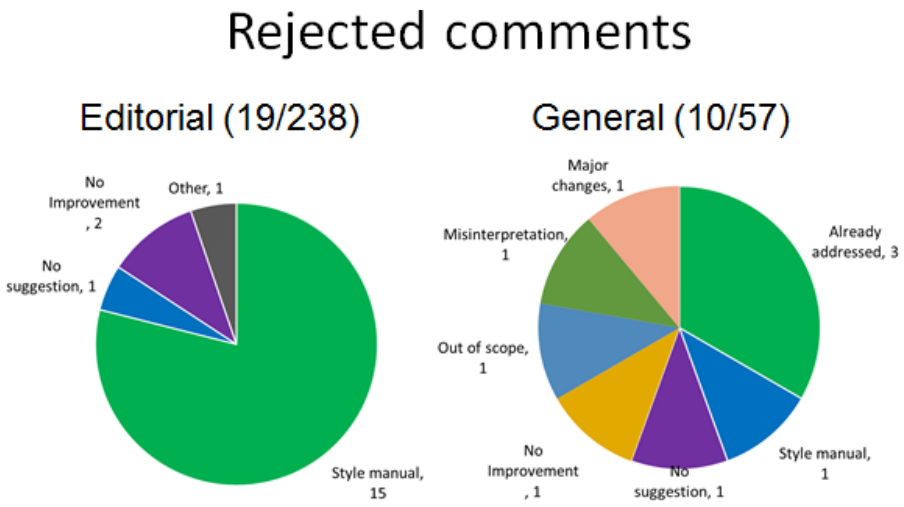
Comment resolution

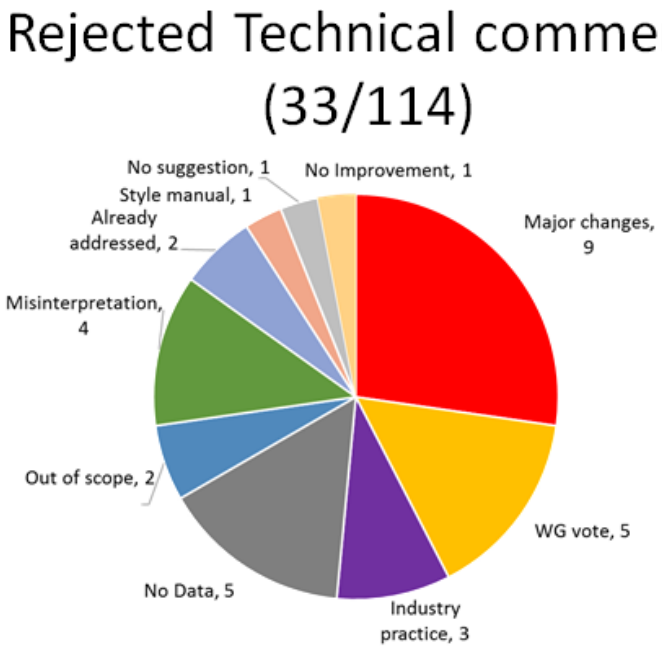
- Draft 5.1 has been created including all the Accepted and Modified comment resolutions
- A red lined and a clean version, as well as the comment resolutions spreadsheet, has been made available on the Fluid Subcommittee web page.
- All comment entries are highlighted in yellow with associated comment number in the margin.
- A notification email was send to all WG members on Friday September 28.
- Upon the close of a ballot, the BRG must present the result of the ballot and ballot review (vote count, comments received, and comment resolutions, including changes made to the draft) to the complete WG for approval.
- This is the purpose of todays meeting
- If approved by the WG, the same information will be send to the Sponsor balloting group for approval and further comments (recirculation).

Comment resolution group work

- Most comment (59%) have been accepted as suggested. The majority of the editorial comments fall in that category.
- Some comments have been accepted in principle, but with suggestions needing adjustment. 26% are in the modified category.
- Note from the chair: The exact reparation could change following some editorial requests from IEEE committee.
- Some comments are rejected when they are unusable for draft revision. 15% have been rejected

- A suggestion could be rejected for one, or more, of the following reasons:
  - Incompatible with the IEEE Style manual
  - No suggestion or unsupported suggestion
  - Does not improve understanding
  - Against a WG vote or recommendation
  - Does not correspond to the industry practice
  - Already addressed in a different part of the document
  - Out of scope
  - Misinterpretation of the draft
  - Require major changes incompatible with the project status
    - extended modification of the text
    - modification of the methodology
    - could not be supported by available data





Review of main changes in Draft 5.1

Notable modifications

Purpose (1.2) (Revision)

The purpose of this document is to provide a guide for evaluating dissolved gases analysis results from mineral oil immersed transformers using statistical based analytical tools and fault interpretation methods.

Comment was made to change the wording from “statistic” to “statistical”. A motion was made by Tom Prevost and seconded by Jim Graham to approve the Purpose as modified above. The motion passed.

The WG officers will request PAR changes to for the revised scope and purpose before the closing of the ballot.

Limitations (1.3) (Addition)

This guide is applicable to mineral oil immersed transformers and reactors of all type, size, voltage classes, construction, and usages, except those excluded in 1.3.

See text in draft concerning wind turbine application

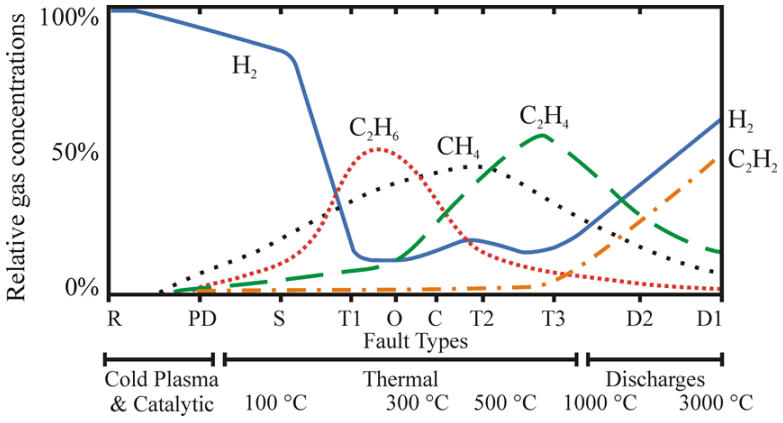
There was no objection to the proposed text.

Definition (3.1) (Addition)

Rate: Constant gas generation over a certain period, expressed in µL/L/year. In the context of this guide, rate is computed by linear best fit from 3 to 6 consecutive DGA covering a period of at least 4 months to a maximum of 24 months.

There was no objection to the proposed text.

Figure 1 (4.1) (Update)



NOTE—See 3.2 for faults acronym and Annex C for faults type definition

There was no objection to the proposed figure.

Warning box added (4.4) (Addition)

WARNING
Sampling from a transformer tank when negative pressure is known or suspected should never be done, as it will result in air ingress and possible immediate or future catastrophic failure of the transformer.

There was no objection to the proposed WARNING.

O_2/N_2 rationale (5.4) (Addition)

NOTE—The O_2/N_2 ratio was proposed for evaluation as a proxy for distinguishing sealed units from free breathing ones. This approach was used to evaluate the large database where this information was mostly absent, and the break point based on the data suggested the limit of <0.2, or >0.2. An O_2/N_2 ratio ≤0.2 is observed in most N_2-blanketed transformers and in about 60% of membrane-sealed one. An O_2/N_2 ratio > 0.2 is observed in all air-breathing transformers and in about 40% of membrane-sealed transformers. However, one should not infer from this approach that by looking at the O_2/N_2 ratio found in a specific sample that you can identify if the transformer is sealed or breathing, as other factors could influence this ratio.

Comment was made to start the above as "Although, the O_2/N_2 ratio was proposed…" The person that voted negative indicated he was OK with it as written, so there was no further discussion.

Clarification on rate computation (6.1.1) (Addition)

If more than 6 data points are available, use the six most recent data points to compute the rates, not exceeding two years.

There was no objection to the proposed text.

Clarification on yearly sampling (6.1.1) (Addition)

Note if only 1 sample per year is taken, there will not be enough samples to calculate the multipoint gas generation rates for comparison to Table 4, so only Table 3 would be used in such cases. If Table 3 is exceeded, a confirmation sample is required, which will allow the computation of the rates (e.g. 3 samples in 2 years).

There was no objection to the proposed amended text

Source of gas (6.2.1) (Addition)

Hydrogen, H_2, is created primarily from corona partial discharge and stray gassing of oil, also from sparking discharges and arcs, although C_2H_2 is a much better indicator in such cases. It can also be caused by chemical reaction with galvanized steel.

Methane, CH_4, Ethane, C_2H_6 and Ethylene, C_2H_4, are created from heating of oil or paper.

Acetylene, C_2H_2, is created from arcing in oil or paper at very high temperatures above 1000°C. Transformers without internal fuses, switches or other arcing devices that may have operated should not create any C_2H_2 under normal operating conditions. It is not uncommon to find increased levels of H_2 or C_2H_4 when C_2H_2 is detected.

The ranges of temperatures where these gases are mostly produced in oil can be seen in Figure 1. It can also be seen in Figure 1 that mixtures of these gases are always formed at any temperature. By looking at their relative proportions in oil, one can identify the faults which have produced them, using one of the methods described in 6.2 or Annex D.

Carbon Monoxide, CO, and Carbon Dioxide, CO_2, are created from heating of cellulose or oil insulation.

There was no objection to the proposed text.

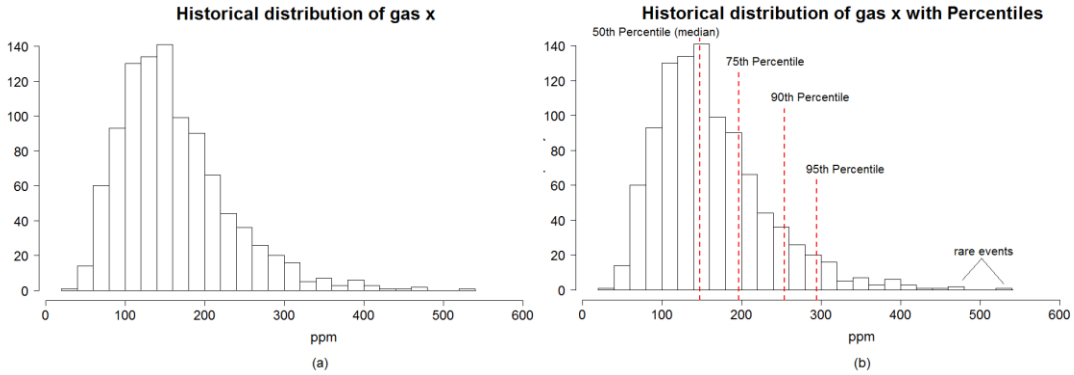
Link to Duval methods (6.2.3) (Addition)

Free algorithms for using the Duval Triangles Methods are available from the IEEE Transformer Committee web site at:

http://www.transformerscommittee.org/subcommittees/fluids/Duval/DuvalTriangles1_7-29Mar2016.xls

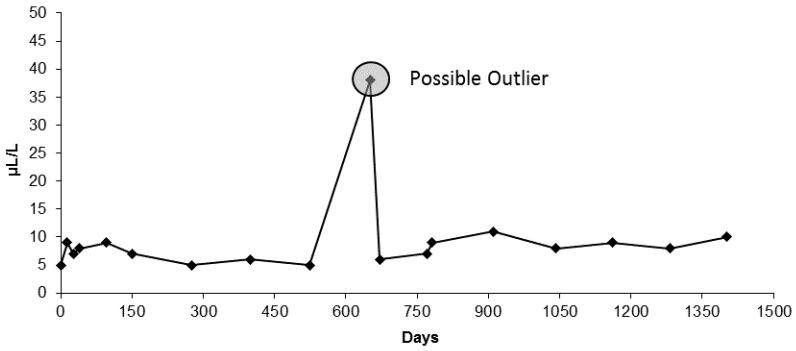
A quick discussion occurred concerning the impact of web server changes at the committee level. It was noted than the final guide publication will likely occur after these upcoming changes are implemented and that the hyperlink would be adjusted accordingly. There was no objection to the proposed link.

Concept of percentile (A.1) (Addition)



There was no objection to the proposed graphs and associated text.

Simpler example (B.2) (Addition)



Point Number	Days	µL/L	Delta µL/L	Table 3 Norms	µL/L/year	Period in Days	Table 4 Norms
1	0	5	N/A	N/A	N/A	0	N/A
2	17	9	4	20	N/A	17	N/A
3	68	11	2	20	N/A	68	N/A
4	80	14	3	20	N/A	80	N/A
5	122	34	20	20	75	121	7
6	150	30	-4	20	69	150	7
7	157	30	0	20	68	140	7
8	179	39	9	20	85	111	7
9	204	32	-7	20	53	124	7

There was no objection to the proposed example and associated table, figure and text.

Discussion:

Jim Thompson indicated a concern in the lack of guidance for sampling in less than a four month timeframe. He suggested this could go into an Annex. He also indicated that all 95th percentile values for six months or less will exceed Table 4 values.

Response was that Table 4 is only for use with multi-point trend analysis and its purpose is to detect low gassing rate when gas levels are low. Table 4 intent does not provide guidance on the sampling interval. The four month minimum of Table 4, and its associated 3 to 6 samples, is the minimum required to detect small continuous rates when gas concentrations are low and natural DGA variations are comparatively high in regards of gas levels. The observation was made to not confuse sampling frequency (sampling interval) with sampling period (time between first and last samples of a series). There are no recommendations in the guide concerning limiting sampling frequency to four months. On the contrary, the recommendation, when an ongoing gassing is suspected, is to install on-line monitoring that offers very high sampling frequency. The commenter is also using data out of its intended use, such as data from heat runs, which are specifically excluded from the present draft. Use of any data out of context will inevitably cause issues. The commenter is also using data from F12 and F13 presentations coming from 2 point 'rates' computation in his argumentation concerning Table 4 limitations, contrary to the draft procedure recommendation of multi-points rates that are required for the use of this Table.

The Chair indicated that Jim's suggestion to go to an annex was not in line with the commenter submitted comments and suggested changes (i-350, i-351 and i-352), that were rather to revert to the 2008 version of the guide and to eliminate Table 3. As such, his recommendation could not be accepted, as it is a new comment, ineligible at this stage of the ballot resolution group (BRG) work review.

A motion was made by Stephanie Denzer and seconded by Brian Sparling to approve the work of the Ballot Resolution Group move the document forward for recirculation. There were 47 for and 1 against the motion. The motion carried.

The meeting was adjourned at 4:23PM

Claude Beauchemin
WG Chair

Don Platts
WG Vice-Chair

Norm Field
WG Vice-Chair

Susan McNelly
WG Secretary

Appendix II

Working Group for Acceptance and Maintenance of Insulting Liquids

Tuesday, October 16, 2018

1:45 – 3:00 PM

Jacksonville, FL USA

Minutes of WG Meeting

Chairman Tom Prevost
Vice Chair Scott Reed
Secretary (Open)

The meeting was called to order at 1:45 pm by Chair Tom Prevost.

There were 27 of 35 members present. There were 78 guests. A membership quorum was achieved.

Agenda
1) Introductions
2) Approval of Agenda
3) Approval of Spring 2018 Minutes
4) Call for Patents
5) New Document:
a. Title
b. Scope
c. Purpose
6) Review of Documents and Task Forces
7) Task Force Reports
8) New Business
9) Adjourn

The Spring 2018 minutes were unanimously approved. The Fall 2018 agenda was unanimously approved.

Chairman Prevost posted the Patent Claim. No claims were made.

Chair's Remarks:
Chairman Prevost reviewed the scope and purpose of the guide. Next, the chair asked each task force to speak about their respective sections.

TF1-Types of Insulating Liquids, Jinesh Malde
Jinesh announced his committee met October 14th and has 11 members. The task force will begin to consolidate information from the existing guides and is in the process of identifying background information for each fluid type. In addition, Jinesh will work to identify the appropriate liquid tests and their significance as well as evaluate new liquids to be included as part of this guide.

TF2- In Service, Scott Reed
Scott shared that his task force has meet and will consolidate information from existing guides that discuss in-service liquids. However, the task force has questions about voltage classes and thresholds for liquids that do not have any established values, as well as consideration for new liquid tests and new liquids. It was decided that TF2 will work with TF1 as they work to establish thresholds for as supplied, as received, and after filling as well as any new liquid tests that should be included. Chair Tom announced that voltage classes will be added to the Spring 2019 agenda.

TF3-Mixture of Insulating Liquids
Alan Sbravati has agreed to take over as task force chair for mixture of liquids. Alan questioned how retrofilling should be handled in this guide, It was decided to bring the question before the Insulating Liquids Sub-Committee of whether to make retrofilling it's own guide.

TF4- Maintenance of Insulating Liquids, Rich Simonelli
Rich reported that he is still looking for volunteers for his task force. Jim Thompson, Mike Lau, Jon Karas, Andrew Holden and Jimmy Rasco volunteered to assist. Rich also questioned whether re-refined oil is a maintenance classification to consider. It was decided it would not be considered as part of the task of maintenance since the oil is treated off site. It was further decided that more information is needed from ASTM to determine if this is a liquid for consideration under this guide.

T5- Insulating Liquids for LTC's, Rainer Frotscher
Rainer delivered a presentation that defined the parameters and the relevance for tap changers and the specific requirements of different liquids used in tap changers. The task force also identified the suitability of liquids for different tap changer types. The task force also identified potentially new liquid tests for both new and in-service liquids that should be considered for tap changer applications as well as developing thresholds for greater than 230 kV.

Old Business:
Chairman Prevost addressed 'New' Insulating Liquids or 'Unused' Insulating Liquid previously questioned.

As supplied by manufacturer: D3487
As received: C57.106 meet D3487 and Table 1.
After filling: C57.106 must conform to Table 2 (230 kV or > 230 kV).

The working group will continue the discussion of new liquids at the next meeting.

New Business:
Chairman Prevost stated that voltage levels within the acceptance tables will be discussed at the next meeting. Introductory material to facilitate this discussion will be distributed before the next meeting.

The meeting was adjourned at 3:00 pm.

Scott Reed, Vice Chair

Annex H Insulation Life Subcommittee

October 17, 2018
Hyatt Regency Jacksonville Riverfront, Jacksonville, FL, USA

Chair: Sheldon Kennedy
Vice-Chair: Barry Beaster
Secretary: Jinesh Malde

The Insulation Life Subcommittee (ILSC) was called to order by the Chair in Jacksonville, FL on October 17, 2018 at 8:00 AM. Due to the size of the group, general introductions were not made. The Chair requested that each person state their name and affiliation when addressing the subcommittee.

H.1 Chair's Report/Remarks

The chair provided the dates of upcoming Transformer Committee meetings as follows;

2019 Spring Meeting; March 24-28, 2019, Anaheim, California, USA

2019 Fall Meeting; October 27-31, 2019, Columbus, Ohio, USA

The Chair requested that any person with knowledge of a patent essential to meet the requirements of any subcommittee standard to bring the issue forward for discussion. No one responded to this request.

The Chair requested the following items be included in all activity group minutes;

- The name of the activity
- The date and time of the meeting
- The number of members and guests in attendance. Full attendance should be recorded in the AMS system
- The presence or absence of a quorum
- Any essential patent issues raised during the meeting.
- A summary of discussion. Intricate detail not required. Use a separate document to explain decisions that are made.
- A record of the decisions made in the meeting
- If there will be another meeting. If so, state the time and place.
- Submit minutes as soon as possible, but no more than 15 days after the meeting.

The Chair informed that going forward, groups that works on comments from the ballot will be called "Comments Resolution Committee" and not "Ballot Resolution Committee"

The Chair reminded everyone that working groups must achieve a two-thirds majority to submit a document for Sponsor Ballot. The subcommittee must achieve a simple majority to submit a document for Sponsor Ballot.

The Chair discussed the membership requirements and recognized the following new members: Stuart Chambers, Everton De Oliveira, Pugazhenthi Selvaraj, Robert Stinson and Janusz Szczechowski.

The Chair stated that the following members had been moved to guest status due to lack of attendance; Jonathan Cheatham, Donald Chu, Craig Colopy, Victor Garcia, Thomas Holifield, Amitav Mukerji, Devki Sharma, Kwasi Yeboah and Waldemar Ziomek.

The Chair also noted that no new guests were removed by request.

H.2 Secretary's Report

The Chair reported that according to the electronic check-in system, 78 out of 121 members were present in the meeting and that a quorum had thus been achieved.

The Spring 2018 subcommittee meeting minutes had been provided to participants in advance of the meeting for review. Wallace Binder made a motion to approve the minutes and the motion was seconded by Craig Stiegemeier. Hearing no objections or abstentions, the motion carried by acclamation.

The Fall 2018 subcommittee meeting agenda was provided to participants in advance of the meeting for review and they were also presented on a screen at the meeting. John John made a motion to approve the agenda and the motion was seconded by Phil McClure. Hearing no objections or abstentions, the motion carried by acclamation.

Consolidation of the final electronic check-in records and written attendance rosters after the meeting indicated that 80 total members and 123 guests were present at the meeting.

26 guests requested for membership via the membership roster and 7 met the membership criterion; Bill Griesacker, Akash Joshi, Jose Salva, Brad Staley, Babanna Suresh, Alan Traut, William Whitehead,

H.3 Project Status Reports. The Chair reported the status of each project as follows;

H.3.1.1 C57.91 IEEE Guide for Loading Mineral-Oil-Immersed Transformers

C57.91 is valid until 2021. The Working Group Chair is David Wallach.

H.3.1.2 C57.100 IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution Transformers

C57.100 is valid until 2021. The Working Group Chair is Roger Wicks.

H.3.1.3 C57.119 IEEE Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings

New revised standard published on October 18th 2018

H.3.1.4 C57.154 Design, Testing and Application of Liquid-Immersed Transformers with High-Temperature Insulation

C57.154 is valid until 2022. The Working Group Chair is Richard Marek.

H.3.1.5 C57.162 Guide for the Interpretation of Moisture Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors

C57.162 is a new document. The PAR for creating this document expires December 31, 2021. The working group Chair is Thomas Prevost.

H.3.1.6 C57.165 IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors

C57.165 is a new standard and the PAR expires December 31, 2021. The working group Chair is Phil McClure.

H.3.1.7 1276 Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers

1276 expires Dec 31, 2018. PAR extension has been filed. The working group Chair for this document is Roger C. Wicks.

H.3.1.8 1538 IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid-Filled Transformer

1538 guide is valid until 2021. A task force met in Spring 2018 conference to formulate a PAR for document revision. The taskforce did not meet in Fall 2018. The working group Chair Donald Platts resigned.and transferred duties to Scott Digby

H.3.2 Working Group and Task Force Reports

H.3.2.1 Working Group on C57.162 Guide for the Interpretation of Moisture Related Parameters in Dry, Gas Insulated and Liquid Immersed Transformers and Reactors – Tom Prevost

Working group met on Monday Oct 15. 40 out of 106 members were present in the meeting. 3 attendees requested membership. Quorum was not met so the group could not conduct official business. Minutes from Spring 2018 and Agenda for Fall 2018 could not be approved

The chair informed the group that the officers will review the attendance at recent meetings so that members who have not attended the last three meetings will be changed to guest status in order to reach quorum.
The chairman then asked for any patents that prohibits work in progress. No one had any to bring up.
The chairman briefing described the agenda.
The meeting started with the review of the purpose and scope of the WG.
The chairman proposed a change to the scope of the project.
The new scope will remove dry and gas insulated transformer. This would eliminate Task Force 2.
This will require a change to the PAR. Since quorum was not met at the meeting the Chair stated that this would be done by email ballot.

The task force leaders then updated the WG on the progress of their respective task forces. The chairman asked for all the information from the Task Force leaders so the Secretary could start to assemble the document.

Task Force 1 Terminology and Definitions
Task Force Leader - Jeff Golarz
Jeff Golarz has a list compiled from TF chairs that have sent terms to him.

Task Force 2 Measurement and evaluation of moisture-in-gas insulation parameters
Task Force Leaders- Tom Melle
This task force will be discontinued. The chair thanked Tom for his efforts.

Task Force 3 Measurement and evaluation of moisture-in-liquid insulation parameters
Task Force Leader- Ron Hernandez
Ron gave an update on task force activities. They plan to meet later on Monday in next meeting. The plan is to have a draft complete before the next WG meeting. The chair mentioned that there will be a tutorial at the next ASTM meeting to include evaporative stripping technique to determine water in oil. This was already planned to be incorporated in the draft because it is covered by an IEC standard.

Task Force 4 – Measurement of moisture in solid insulation.
Task Force Leader – Ron Hernandez
The first draft of this chapter is complete.

Task Force 5 Evaluation of moisture in solid insulation using dielectric response methods
Task Force Leader - George Frimpong
The first draft of this chapter is complete.

Task Force 6 Inferring of moisture in solid insulation from measurements conducted in liquid or gaseous medium
Task Force Leader - Valery Davydov
The first draft of this chapter is complete.

Task Force 7 Evaluation of aging and end of life of solid insulation parameters
Task Force Leader- Bob Raser
Bob reported that he has formed a task force and that they plan to have a draft complete before the next WG meeting in Anaheim.

Task Force 8 Factory/workshop application of knowledge on moisture; establishing baselines
Task Force Leader - Poorvi Patel
The first draft of this chapter is complete.

Task Force 9 Field application of knowledge on moisture
Task Force Leader – Jim Thompson
*** Note:** ***This section lists the risks associated with moisture***
The task force still needs some work. The chair suggested that the impact of moisture on the dielectric strength of solid insulation should be included as well. There was some discussion about mitigation techniques. Bob Raser stated that he submitted some information on field drying of transformers to include in this chapter. The Chair suggested that the WG coordinate with C57.93.

Task Force 10 Moisture Migration, Distribution and Moisture Equilibrium Charts

Leader – Tom Prevost
The chair of TF 10 asked for volunteers to join this task force. Several individuals volunteered to help on this Task Force. The plan is to have a draft complete before the next meeting.

Meeting adjourned at 12:05 PM

H.3.2.2 Working Group for Application of High-Temperature Materials IEEE P-1276 – Roger Wicks

Meeting took place at 3:15 on October 16th afternoon. 23 members attended the meeting and met the quorum (minimum of 21 members). 50 guests were registered by the RFID check in, but only 41 signed the roster.

A. Approval of Fall 2018 Meeting Minutes – Pittsburgh, PA J. Arteaga

Marion Jaroszewski made a motion to approve the minutes and Alan Sbravati seconded it. The group unanimously approved the minutes.

B. Approval of agenda

Marion Jaroszewski made the motion to approve the agenda and Kevin Biggie seconded it. The group unanimously approved the agenda.

C. Patent Disclosure R. Wicks

There were not issues related to Patent Assurance brought up by attendees in the meeting.

D. Discussion R. Wicks

In April 2018, a working group ballot was conducted to determine the suitability of draft 2.0 to go to IEEE-SA ballot. Our procedures require a super-majority (2/3 vote) at the working group level to allow the document to proceed to ballot. With this super-majority, the Insulation Life Subcommittee would then approve the vote (by a majority vote) confirming that the balloting process was conducted correctly.

The working group ballot was successful, with a 70% affirmative vote and a quorum was met. The Insulation Life Subcommittee approved the vote as well.

However, because it was agreed to resolve negatives at the working group level (in our fall and spring meeting minutes), a Comment Resolution Group was selected for the IEEE-SA ballot to help resolve technical comments related to this document. The members of the Comment Resolution Group were Clair Claiborne, Marion Jaroszewski, Alan Sbravati and Roger Wicks.

The chair started work on the comments to the document by accepting, unless there were conflicts, all editorial comments proposed in the document.

The Comments Resolution Group held numerous conference calls to confirm these editorial changes and to then deal with the technical recommendations in the document. Finally, a document was completed with the final changes for which a consensus was reached.

After the changes had been completed, the revised document was recirculated within the working group, and the supermajority approval was maintained.

At this point it was agreed that the ballot could be initiated, and draft 2.3 was submitted to the IEEE SA to initiate a ballot pool, which was open until October 25th. Draft 2.3 had also been submitted to IEEE-SA for the required editorial review, which was completed and minor revisions will be completed when the ballot pool is finalized.

The Comments Resolution Group will help to resolve any negative ballot issues, and following this a recirculation will be required.

The PAR expires by the end of 2018, and an extension has been filed to allow the completion of this work.

The significant changes made by the Ballot Resolution Group were:

- Clause 3: definitions were reviewed including original IEEE 1276 and latest version of C57.154, avoiding conflicts and duplications.

- Clause 5: modifications to the tables taken from IEEE C57.154.

- Clause 7: addition of distribution transformers. Clause 8: removal of redundant features, but also addition of technical comment (from original IEEE 1276) on bubbling.

- Clause 9: very significant work in the area of loading guidelines. This was the area where the most work was required for the document.

- Annex A: very significant editorial changes were made, as well as some improvement in technical information.

- Annex B: an addition was made to this section providing a loading guide example for natural esters based on the procedure outlined in Section 9 and the aging data provided in Annex B.

In Clause 9 it shown now how a loading guide could be developed using A and B constants from Arrhenius reaction rate theory derived from aging experiments conducted per IEEE C57.100. A table modeled after the dry type loading guide was developed which shows examples of A and B constants under different scenarios – similar HIC to the industry proven system of TUK and mineral oil, as well as scenarios with B constants (slope of the line) ranging from 12,000 to 18,000 (plus or minus 25% of the current slope of 15,000).

For ester fluids a specific example was included was made to show how to generate the factor A and B.

Special recognition was made to John Luksich whose original draft loading guide for natural esters formed the basis of this revision, as well as its inclusion in Annex B.

E. Adjournment

The meeting adjourned at 3:49 PM

H.3.2.3 C57.119 IEEE Recommended Practice for Performing Temperature Rise Tests on Oil-Immersed Power Transformers at Loads Beyond Nameplate Ratings – Gael Kennedy

New revised standard published on October 18th 2018

H.3.2.4 C57.91 IEEE Guide for Loading Mineral-Oil-Immersed Transformers – David Wallach

23 out of 51 members were present in the meeting. Quorum was not met for two consecutive meeting. On call for patents, there were no applicable patents identified. The PAR expires in 2021.

There was great deal of discussion and it was agreed to form sub-groups for revising the guide: Proposed subgroups for revision:

- Distribution transformer loading; Generation of a possible survey was brought up at a past meeting. The suggestion was made to contact TF Transformer Efficiency and Loss Evaluation led by Phil Hopkinson. Phil reported that there may be some information from the TF that could be useful for the C57.91 guide. Phil has data from several utilities now. Dan Mulkey is working through the data. This WG will stay in contact with TF Transformer Efficiency and Loss Evaluation.

- Don Platts presented a summary of his findings related to IEC 60076-6. He mentioned that the limits in C57.91 was based upon the operating philosophy of PG&E and was designed to be a guide. IEC limits were very similar to IEEE ones. GMD standard C57.167 temperature limits were also similar to C57.91. IEC designs were based upon Kraft paper that allowed more ageing of paper as compared with IEEE's upgraded paper. Shibao Zhang pointed out that there is no time limit like IEC to which Don explained that the time duration is implied in IEEE standards.

- For condition based risks, it was suggested we coordinate with the TF Bushing Overload. Shibao Zhang mentioned that the bushing temperature limits in Section 3.1 were taken from C57.19.100 which has since been deleted from that standard. Shibao agree to review Section 3.1 and suggest revisions.

- Ancillary Component loading: More guidance needed to work on enhancements to Clause 9.2.2. Weijun Li offered to help in suggesting updates to this section.

- Work related to fiber optics is already going on in the C57.165 Guide for Temperature Measurement WG. It was agreed that we will make a reference to this guide in C57.91 depending on the status of C57.165 when C57.91 final draft is prepared.

- Oleg Roizman asked if we need to provide differential equations in Section 7 and Annex G like what the IEC standard has. Oleg agreed to make a presentation during the next WG meeting on this topic. Weijun Li felt that differential equations do not belong in this guide.

- David Wallach mentioned that we do not expect other major changes to be made to this guide other than those we have been discussing. Robert Thompson agreed with David's assessment.

No other topics were discussed

During the ILSC meeting, ILSC Chair suggested sending an email out to the members to get approval for prior meeting minutes.

H.3.2.5 C57.165 IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors – Phil McClure

The Chair called the meeting to order at 9:30 am and welcomed the attendees to the 2018-02 meeting of the working group.
The patent slides were displayed and the attendees were asked if any of them were aware of any patents that may be essential to any aspect of the work we will be doing and if so, that they must inform at least one of the officers in order that IEEE may be notified. There were no responses to the inquiry.
The attendees introduced themselves and the attendance rosters were circulated. There were 16 members, 6 previous guests and 24 new guests attending. No guests requested membership.
16 of 34 members were present and a quorum was not achieved.
The minutes from the Spring 2018 meeting were circulated among the members prior to the meeting however, because of the lack of a quorum the minutes could not be approved. The minutes will be recirculated to the members by email and approval shall be requested using that media.
Old business - none
New business :
Reviewed draft 2 of the guide

- Greg Anderson and Gary Hoffman collaborated on and submitted two sections covering Ambient Temperature Measurement and Liquid Temperature Measurement. These sections were reviewed and commented by the group and the authors were asked to review the comments and revise the content as they deemed appropriate.
    - In the Ambient Temperature Measurement Section 4.1.3 Purpose of Ambient Temperature Measurement the following modification was suggested:
        - Std C57.12.00 states that the temperature of the cooling air (ambient temperature) shall not exceed 40°C above ambient temperature, and the average temperature of the cooling air (ambient temperature) for any 24 h period shall not exceed 30°C.

  - In the Liquid Temperature Measurement Section 4.2.2.2 Bottom oil temperature sensor locations the following comment and suggestion for modification was made:
    - The thermal sensing element shall be mounted on the tank wall in a closed well at a level of no less than ~~150~~ 15 mm (~~6~~ 0.591 inch) above the tank drain valve.
    - The authors were requested to check and verify the suggested mounting position.
- Phil McClure submitted the section covering Tank Wall Temperature Measurement. This section was reviewed but no comments were made.
- Annex A, "Sensors", which was a section imported from work done by the Task Force on Winding Temperature Indicators was edited by Phil McClure. No comments were made due to extent of the section.

The Chair asked for volunteers to author other sections with the following results:

- Oleg Roizman volunteered to manage the definitions section. This involves checking our definitions against IEEE definitions and highlighting differences accordingly.
- Shamaun Hakim volunteered to help other authors write section 4.4 Core Temperature Measurement
- Shamaun Hakim volunteered to help other authors write section 4.5 Tap and Tie Temperature Measurement.
- Section 4.8 Bushing Temperature Measurement is still without an author.
- Section 4.9 Tie Plate Temperature Measurement is still without an author.
- Section 4.10 Tap Changer Lead & Contact Temperature Measurement is still without an author.
- Section 4.11 Bolted Connection Temperature Measurement is still without an author.

It was agreed to place Draft 2 of the guide on the Transformers Committee website.

The next scheduled meeting was announced:

- March 24th -29th in Anaheim, California

With no more business and time running out, the Chair asked for a motion to adjourn.

- Gilles Bargone motioned for adjournment
- Mark Shem-tov seconded the motion
- There were no objections and the meeting was adjourned.

Meeting was adjourned at 10:30.

H.3.2.6 Task Force to develop PAR for IEEE 1538 Maximum Winding Temperature Rise in Liquid-Filled Transformers – Don Platts

The taskforce did not get a PAR approved for this document. The taskforce did not meet in Jacksonville. The PAR will be approved by the next meeting. The Chair for the taskforce requested for new leadership. Scott Digby agreed to be the Chair for this taskforce

H.3.2.7 Task force to develop PAR for revision of C57.100 IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution Transformers – Roger Wicks

Taskforce will become a working group (WG) by Spring 2019 meeting.

The Chair called the meeting to order at 9:15 AM and welcomed attendees to this second meeting of the task force. The Chair noted members of the previous Working Group on C57.100 have been added as guests on the rosters. As we are still a task force, attendees requesting membership will be added to the total number of members in addition to the 18 previously listed from the prior meeting.

The Chair reviewed the proposed meeting agenda, and heard no objection to the agenda (no vote taken as a task force), and no approval of the last meeting's minutes for the same meeting. The bulk of the agenda was spent with presentations related to experiences in testing to IEEE C57.100-2011 as well as a presentation on magnet wire testing. The chair also quickly reviewed the previously agreed title, scope and purpose and notified the taskforce of the status of the PAR submission (waiting on approval).

There were 104 total attendees at the meeting, of whom 9 were members from the first task force meeting. As this meeting was also a task force meeting, any guests requesting membership at this meeting will also be added to member status.

H.3.2.7.1 Presentations Related to future work.

The bulk of the meeting was devoted to presentations related to the following subjects:

- Enamel coated wires – discussion on wire testing per ASTM, NEMA, etc. Does this help us for evaluation of new insulation systems – Mike Shannon – Rea Magnet Wire
- Experiences in testing to IEEE C57.100-2011. Sealed Tube Testing – Sasha Levin/Kevin Bigge – Weidmann, Alan Sbravati – Cargill, and Roger Wicks – DuPont
- Experiences in testing to IEEE C57.100-2011. Dual Temperature Testing – Roger Wicks

Enamel Coated Wire Testing

Mike Shannon provided a background to the testing of PVF coated wire that is typically used in industry proven systems, but is rated by NEMA as a 105°C wire. He outlined the testing protocols for this wire tested for transformers, which includes testing at either 1 or 4 weeks at 150°C and evaluating dielectric performance. Mike's presentation will be uploaded to the transformers committee website.

Shamaun Hakim asked a question related to the 105°C rating for our 120°C application, and the Chair noted this would be addressed in the Weidmann presentation. Alan Sbravati noted that they too had done wire testing, and consider that end-of-life criteria for such testing might be interesting as well.

Sealed Tube Testing

Sasha and Kevin provided a detailed review of testing conducted at Weidmann, including a number of recommendations as a result of this testing. These recommendations need to be part of our discussions as we begin work on revising this document.

Magnet Wire testing was the first subject covered, and the fixture for the wires as part of the test, as well as the method of test is key, especially if very long aging times incorporated in our current IEEE C57.100 document are used. The ratios of the materials included may need to be adapted if these wires are part of the test. The Chair noted that the fixturing for testing of the paper may be important as well. Sasha also recommended that PVF be considered as part of our Industry proven system.

The next subject was data showing results for testing at both power ratio and distribution ratio which shows a different effect. This lead to a recommendation confirming that separate tests would be needed for systems covering multiple applications. The chair's presentation showed a similar result.

A plot was shown related to testing to 135,000 hours rather than 180,000 hours. The comment related to this is that the samples are much more "testable" when aged to the shorter duration. The chair noted this 180,000 hour point was chosen to correlate aging to our life equation from C57.12.00, this obviously will be an area where thought on how to data from this procedure with a different life basis than 180,000 hours will need to be considered. Alan's presentation noted that there are multiple times temperatures (65,000, 135,000 and 150,000 hours in addition to 180,000 hours).

Sasha then presented data from two papers with different rates of aging, and with dramatically different initial (and final properties), raising the question of percent retention or absolute strength. We need to understand how to determine a minimum mechanical requirement, which may be a challenge but worth considering. Alan Sbravati concurred with this issue based on some of their testing.

He then finished his portion of the meeting with a discussion on pressboard and that all of the current transformers use pressboard (which is not thermally upgraded) as part of the insulation system without any thermal degradation issues that are unique from the TUK. His recommendation here is to include this pressboard as part of our industry proven system.

Kevin then took over related to discussion on ratios – showing the need to better clarify and suggesting use of the table from IEC 62332-2 as a possible way of doing this. He then discussed data showing laminated products (wood or pressboard) which are typically utilized in power transformers and should be included (with ratio modifications) as part of the aging protocol.

Kevin then showed data for different pressure relief devices (10 and 31 psig) which showed an effect of this level on aging. Their recommendation is to use 10 psig to be consistent with the IEEE C57.12.39 document which deals with tanks (and is consistent in level with IEC 62332-2). In Alan's presentation he noted the need to retain all degradation products to get a correct evaluation. Stuart Chambers mentioned an expansion system then use (the Chair noted this is similar to one that Weidmann uses in Switzerland), and Jinesh Malde raised concern about the complexion of such a system. Clearly this will be an area of additional discussion as our current document is not specific in this area. Alan did note that some of their testing used a 30 psig relief valve as well.

Kevin completed his presentation with some clarity on designations (samples vs. vessels) to make sure the correct number of samples are tested, and recommended that the materials tests should be part of the main body of the document. He noted as well the need to conduct testing in parallel (rather than sequentially – in same oven if possible at same time) and that there would be a benefit to merge the best aspects of both the IEEE C57.100 and the IEC 62332 series of documents. Alan

also noted that these materials tests should also be included in the main body of the as well, which may require reorganization as well.

Alan then presented his information, some of which is noted above where it covers similar topics. He also reminded of testing related to Lockie tests being the closest to transformer testing, but that these tests typically estimate materials not transformer life. The Lockie test (first proposed in a 1955 paper) was good for distribution transformers and power models were "less effective". The chair noted this was the reason for Bill McNutt to work with DuPont on the dual temperature test – as a better model for materials testing for power applications.

The chair finished with a quick overview from some comparison tests using tables from the current draft of IEEE 1276 based on DuPont and other labs testing related to different ratios, different paper thicknesses, etc. He also provided feedback related to historical dual temperature testing which was developed as part of the working leading up to the development of this test for IEEE C57.100-2011.

The chair closed the meeting noting that the recommendations, topics raised during this meeting will likely be the bulk of the starting point for the spring 2019 meeting in California.

The meeting adjourned at 10:48 AM

H.3.2.8 Task force to develop PAR for revision of C57.154 Design, Testing and Application of Liquid-Immersed Transformers with High-Temperature Insulation – Richard Marek

The meeting was called to order at 4:45PM by Chair Richard Marek. Vice-Chair Anastasia O'Malley and Secretary Ewald Schweiger (writer of Minutes) were also present.

This was the first meeting as a WG. The participants who requested membership at the last TF meeting were carried over as members of the WG.

43 of the total 111 attendees requested membership.

Data from the RFID system: (paper roster)

Number of Members in Activity = 48
Number of Members Present = 30 (31)
Quorum Present = 62.5%
Number of attendees = 106 (111)

Introductions of the Chair, Vice Chair, and Secretary were made. Due to the large number of attendees no individual introductions were made. Attendees were asked to indicate their affiliations when making comments or asking questions.

The chair stated that the previously mailed agenda was re-arranged and some administrative additions were added, including the essential patent notice. A motion was made and seconded to approve the revised agenda. (Stuart Chambers, Robert Thompson) There were no objections. The patent slides were shown with no response.

A motion was requested to approve the Pittsburgh TF minutes, which prompted an objection to a sentence near the end of the minutes, by Alan Sbravati. He made a motion to remove the statement, but after some discussion it was decided that the statement should not be removed, but rather the

objection should be noted in the current minutes. The objection was made to the following sentence: "He (the Chair) noted that the original document was heavily criticized for too much tutorial content; so much of this material should be moved to the IEEE 1276 guide currently under revision". The motion was then made and seconded. (Alan Sbravati, Phil Hopkinson) The minutes were approved with no further objections.

The PAR was approved since the last meeting and the approved title, scope and purpose defined in the Pittsburgh meeting were quickly reviewed.

Title:
Standard for Liquid-Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems

Scope:
This standard applies to all liquid-immersed transformers that are designed to operate at temperatures rise limits that exceed the normal thermal limits of IEEE Std C57.12.00 under continuous load, in the designed average ambient, and at rated conditions.

Purpose:
This standard provides specific requirements and guidance in the design, testing, and application of the transformers covered within its scope. These transformers incorporate high-temperature insulation systems or systems that use a combination of high-temperature and conventional insulation.

A member submitted a suggestion to form a task force/study group to investigate the thermal class of liquids. A motion was requested by the chair and it was made by Aleksandr Levin with a second by Phil Hopkinson**.** The motion carried with no objections. Alan Sbravati volunteered to chair the taskforce and fifteen members volunteered to join the group. The duration of the task force was established at one year and the chair was requested to report their progress to the working group at the next meeting. The following scope was accepted for the task force:

Consider the background and historical applications
Consider options to prove (or develop) the temperature limits for transformer liquids
Propose tentative test procedure(s)

Roger Wicks gave some background information on liquid thermal capability based on other existing documents, noting that the life of a liquid might not be 180,000 hours. He also noted that the standards provide target values which suggest refurbishment of the liquid when certain parameters are exceeded and that these trigger values could be used as end of life. Alan Sbravati shared some differences between mineral oil and esters.

Another suggestion was the addition of a 180 thermal class and the associated temperature limits for the full hybrid insulation systems in Table 3. The chair requested all to review this suggestion and to consider all implications of this addition before the next meeting. The chair also asked the WG to review the values in Tables 3 and 4 and to make sure they are logically defined in the document.

The Chair noted that all members should have received a copy of the current standard. For those who did not receive a copy please contact the officers of the WG. The new members will receive a copy after the meeting.

The front portion of the current version was briefly reviewed. The chair asked for volunteers to

review the Definition section. David Stankes and Jose Salva volunteered.

A question was raised by Juan Castellanos about alignment with IEC 60076-14. The chair reported that at the recent IEC Plenary meeting, the TC14 chair asked to delay revision of the document and to form an Ad Hoc group to review the thermal limits in all of the TC14 documents and make a recommendation on the possibility of consolidating this information.

Radoslaw Szewczyk asked about the validity of this Table 4. Noting that from the point of view of a manufacturer the values are theoretical because they show the material limits and not the design limits of the transformer.

Kurt Kaineder suggested higher temperature limits for the hybrid insulation system. He was asked to make a proposal to be presented to the WG at the next meeting.

Alan Sbravati asked if silicone oil was still used and whether it should be removed from the standard. Jinesh Malde noted that this topic would be discussed in PC57.166. They will determine how to handle silicone oil in this standard. It was also noted that the topic would be mentioned in the Insulation Life SC. Radoslaw Szewczyk reported that there are parts of the world still using silicone and these are using the IEEE standards as reference. The chair noted that if a more generic term such as liquid thermal class was used instead of specific liquid names, the document would be completely generic.

The chair requested that all review the whole standard and to make suggestions for revisions before the next meeting. Suggestions for improvement or for missing items were also solicited.

The meeting was adjourned at 5:55PM and the task force volunteers were asked to provide their names to the Secretary.

H.4 Old Business

There was no old business

H.5 New Business

1) Jin Sim forward the following proposal to the Chair electronically:
   C57.12.90-2015 Clause 11.1.2.2 d) and e) requires holding the current constant for 1 hour. Please consider changing the duration to 30 minutes.
   The proposal was seconded by Ajith Varghese

   Discussions:
   Tom Prevost suggested that the information should go to C57.190 and wait for directions on how to proceed. Gary Hoffman agreed with Tom, that the requests needed to go to C57.12.90. Steve Antosz who is the working group Chair of C57.12.90 agreed with Tom and Gary but suggested that a decision be made by this subcommittee as that is what he would say if the proposal would be brought up to the Standards Subcommittee. The right place to do the work is ILSC. His recommends was forming a taskforce to look into Jin's proposal since ILSC is in charge of thermal test.
   The Chair explained that the recommendation by Jim was to collect data to see if this is a valid concern and determine if the values would need to be changed.
   Shamaun Hakim mentioned that the 1 hour time was there for the oil to be stable. If the time would be reduced to 30 min, the data would become less accurate.

The agreement from the discussion was to create a taskforce to collect data based on Jin's proposal to determine if any further action would be required. The proposal was voted on with 42 positive, 3 negatives and 6 abstained. The motion carried through and taskforce was created. Ajith Varghese volunteered to be the Chair of the taskforce.

2) Alan Sbravati suggested that a taskforce be formed to determine if a guide is required for retrofilling mineral oil transformers with alternative liquids.

Discussion
He brought this topic up during the working group meeting of C57.166. Working group Chair suggested that Alan discuss this with Insulating Liquid Subcommittee Chair David Wallace. In discussing with David, Alan and David thought that this taskforce was better suited for ILSC. ILSC Chair was not sure if this taskforce would belong to ILSC or some other subcommittee.
Javier Artiega mentioned that depending on the voltage level of the transformer, the dielectric properties would change so it would be applicable to Dielectric Test Subcommittee as well.
Luis Cheim mentioned that in CIGRE group, it was common to have joint working groups from different committees. Similar may be applicable for this taskforce work.

ILSC Chair decided that the taskforce will be discussed during the Ad-Com meeting and it will be decided there under which subcommittee this taskforce will belong to.

H.6 Adjournment

With all business completed, the Chair called for a motion to adjourn. Shamaum Hakim moved for adjournment and the motion was seconded by Javier Artiega. The meeting was adjourned at 9:20 AM.

Respectfully submitted,

Jinesh Malde
Secretary, Insulation Life Subcommittee

SC Meetings Planning Fall 2018 Meeting Jacksonville, FL

Meeting Attendance

	2016 Fall Vancouver	2017 Spring New Orleans	2017 Fall Louisville	2018 Spring Pittsburgh	2018 Fall Jacksonville
Attendees	578 (580 – 2)	601 (604 – 3)	595 (599 – 4)	626 (635 – 9)	589 (596 – 7)
Spouses/ Companions	122 (122 – 0)	87 (89 – 2)	64 (65 – 1)	73 (73 – 0)	74 (75 – 1)

Meeting Attendance

Attendees: 589
Spouses/Companions/Guests: 74

Sunday Event: 439 (vs. 424 CAPACITY in Pittsburgh for PAID BANQUET; 423 in Louisville, 489 in New Orleans REGISTERED FOR FREE RECEPTION)

Mon Standards Lunch: 225 signed-up (vs. 234/230/222 in PIT/LOU/NOLA)
Tues Awards Lunch: 245 signed-up (vs. 271/257/252 in PIT/LOU/NOLA)

Early Bird at River City Brewing Company: PLEASE DO NOT REGISTER IF YOU AREN'T GOING TO SHOW UP FOR PAY ON OWN EVENTS!

Spouse/Companion Tours
- Monday, Fernandina: 49 CAPACITY (vs. 50/45/59 in PIT/LOU/NOLA)
- Tuesday, St. Augustine: 52 CAPACITY (vs. 37/43/52 in PIT/LOU/NOLA)

Meeting Feedback DISCUSSION

Considerations for Future Meeting Sites

- hosts
- consideration of # of attendees
- availability of technical tours and activities
- walking distance restaurants
- international airport

Future Meetings

SPRING 2019 — March 24-28
Anaheim, California USA
Hilton Anaheim – starting at $169
*** HOTEL RESERVATIONS ACCEPTED STARTING TODAY, 10/18/18***

FALL 2019 — October 27-31
Columbus, Ohio USA
Hyatt Regency Columbus

SUGGESTIONS: Kansas City, Denver, Milwaukee, St. Louis, Miami, Quebec City

Meetings Subcommittee Updates

- Presentations & Tutorials: Tom Prevost
- Break Sponsor: Ed Smith
- Website: Sue McNelly
- Mobile App: David Wallach
- RFID: Kris Zibert and Dan Weyer NEW VOLUNTEER
- Meeting Schedule: Jerry Murphy NEW VOLUNTEER

- Registration Desk
  - Seaira Ford
  - Jennifer Quandel

Meetings Subcommittee

- Presentations & Tutorials: Tom Prevost
- Break Sponsor: Ed Smith
- Historian: Peter Balma
- Website: Sue McNelly
- Mobile App: David Wallach
- RFID: Kris Zibert and Dan Weyer NEW VOLUNTEER
- Meeting Schedule: Jerry Murphy NEW VOLUNTEER

- Registration Desk
  - Seaira Ford
  - Jennifer Quandel

Volunteer Opportunities

BIG THANKS TO SAMUEL SHARPLESS WITH RIMKUS CONSULTING GROUP FOR STORING OUR BOXES BETWEEN PITTSBURGH & JACKSONVILLE MEETINGS!

AND TO SOUTHERN CALIFORNIA EDISON FOR HELPING US OUT BETWEEN JACKSONVILLE & ANAHEIM MEETINGS!

- Vice chair for subcommittee
- Set up projectors in all meeting rooms before the first meeting of the week and check every morning for continued operation and remove after Tuesday/Wednesday meetings — need at least 2 people to work together on Monday, Tuesday and Wednesday

  NOTE: The hotel will have all the cords run, so all that needs to be done is get the projectors into the meeting rooms before the start of the day's meetings, plug them in and turn them on to verify correct placement on the projector carts; in the evening, just unplug them (you can leave the power cords in the rooms) and bring them back to the storage room for safe keeping.
- At the beginning of each day, remove the prior day's schedule so the current day's schedule is on top on the sign in front of each meeting room; verify each room's schedule against the printed schedule/Guidebook — need one person for Monday through Wednesday
- Daily meeting room review (water stations replenished, chairs placed properly, tables wiped down, dirty dishes/glasses removed at breaks, etc.); work with the hotel to make sure these things are in order at the beginning of every day and throughout the day, as needed — need one point person for Monday through Wednesday
- Help with registration during peak times (Sunday PM and Monday AM)— need 2 people
- Be available throughout the meeting to answer technical questions about the Committee, i.e. how to become a CM, how to become an official member of a WG/TF, etc.
- TASK FORCE: I would like to see a task force formed to help with finding technical tour and other activity opportunities in the cities in which we choose to have our meetings.

  Even with hosted meetings, this group can work with the host to locate other venues that may be appropriate and add value to our meetings (starting with Jacksonville).

New web password for subcommittee private directory (transformer/subcommittee/private folder) – *effective, Monday 10/22*:

pW4TCwba($

user name (as always): xfmrcom


As you're leaving…
DROP YOUR PLASTIC
NAME BADGE HOLDER
AND CLIP IN BOXES
AROUND HOTEL
Thank you and travel home safely!
IEEE PES
Power & Energy Society
IEEE PES
100
YEARS
TRANSFORMERS COMMITTEE

Annex J Performance Characteristics Subcommittee

October 17th, 2018; Jacksonville, Florida, USA

UNAPPROVED MINUTES

Chair: Craig Stiegemeier
Vice Chair: Sanjib Som
Secretary: Rogerio Verdolin
Substitute Secretary: Hamid Abdelkamel

J.1 Introduction / Attendance

There were 77 of the 108 PCS members in attendance so quorum was achieved (71% in attendance). In addition, 82 guests were present at the meeting. The total attendance at the meeting was 159. There were 23 guests who requested membership, if they had attended the last meeting in Pittsburgh they will be added as members. They will be reviewed and added before the Spring 2019 meeting in Anaheim, California USA.

J.2 Chairman's Remarks

The Chair introduced himself, the vice–chair and secretary and provided the below updates and comments.

- 2018 PAR's
  - C57.158 Tertiary/Stabilization Windings (complete)
  - C57.110 Non-sinusoidal Load Currents (complete)
  - C57.21 Shunt Reactors (filed PAR extension in September, D4 approved)
- 2019 PAR's
  - C57.105 3-ph Transf. Connections
  - C57.109 Through-Fault-Current Duration
- 2020 PAR's
  - C57.164 Short Circuit Withstand Guide
  - C57.18.10 Semiconductor Rectifier Transformers
- 2021 PAR's
  - C57.142 Transient Guide
  - C57.32A Neutral Grounding Devices amendment
  - C57.123 Loss measurement guide

- C57.133 Guide for Short Circuit Testing (Expired)
- C57.136 Sound Abatement Guide (Expiring at the end of 2018 – will let expire as appropriate content has been added to C57.12.90 in Clause 13)
- C57.149 SFRA Guide (2022)
- C57.159 DPV Transformers (2026)
- C57.32 Neutral Grounding Devices (2025)
- C57.120 Loss Evaluation Guide (2027)
- C57.32.10 Neutral Grounding Reactors Guide (new)

Working Group / Task Force Leaders

- An agenda must be provided when each leader reviews the preliminary agenda for the next meeting to secure a meeting room at the meeting
- Minutes are officially due in 15 days, but please get at least a draft copy of them to Rogerio (secretary) on Wednesday (the day of the PCS meeting) by 10:00 AM, in MS Word (not PDF) format
- Please keep your webpages up to date – review them regularly and send updates to Sue (a new system is coming that may give you that power)
- A patent call must occur at every WG meeting
- No photography or recording of any kind is allowed
  - Except by officers to support accurate minutes
  - It must not be shared and deleted immediately after use
- Please keep your membership fresh – remove anyone who has missed the last two consecutive meetings

WG / TF Leaders – Process Requirements

- AdCom discussed and agreed that the Comment Resolution Group (CRG) should vote at a simple majority when reviewing comments
- AdCom also agreed that if the comments were brought back to the WG for

consideration the voting requirements would also be a simple majority.

- Virtual meetings between physical meetings help move things along, but you must announce them by circulating an Agenda to the entire PCS using the AM System at least 15 days before the meeting
- Every meeting's minutes must record both member & guest attendance using the AM System and must include: Attendance; Quorum; Motions (with names) and Voting results
- The minutes from every meeting (physical and virtual) must be provided to the PCS secretary within 15 days
- Minutes will be posted on the Transformers Committee website

Attendance / Membership / Quorum

- Please record your attendance on one of the Sign-in Sheets being circulated – we only need your name if you are not on the Sign-in Sheets being circulated
- 9 "Corresponding Members" are counted as "Guests" in terms of attendance for a quorum
- Requests for membership will be granted after the meeting if you've made the past 2 or 3 of the last 5 meetings
- PCS now has 108 members after a review of the Spring 2018 meeting attendance, along with the 4 previous meetings
- A meeting quorum will be reached if 55 members are in attendance

Attendance / Membership – moved to Guest status

The following 6 Members missed the past 2 meetings and have been moved to "Guest" status:

- Mark Perkins
- Larry Coffeen
- Mike Spurlock
- Douglas McCullough
- Adam Bromley
- David Walker

Please contact Sanjib by sending him a message or see him after the meeting if you believe your membership status is not accurate.

Attendance / Membership – New Members

These 11 former Guests requested membership at the Spring 2018 meeting and have attended the past 2 or 3 of the last 5 meetings:

- Robert Ballard
- Florian Costa
- Everton De Oliveira
- Bill Griesacker
- Stacey Kessler
- Cornelius Plath
- Mickel Saad
- Richard vonGemmingen
- Joe Watson
- Joshua Yun
- Peter Zhao

Welcome the New Members: We look forward to your contributions to the Subcommittee

Attendance / Membership – counted as Guest status

These 9 Corresponding Members are being counted as guest status to support reaching the meeting quorum. They continue to receive communications and their guidance for the working group is most welcome.

- Donald Chu
- Larry Coffeen
- Jerry Corkran
- Richard Dudley
- Tamyres Machado Junior
- Dennis Marlow
- Bipin Patel
- Paulette Powell
- Loren Wagenaar

Attendance / Membership – Quorum determination

- Current breakdown of the Subcommittee:
  - 108 Members
  - 55 are needed for a quorum

J.3 Approval of Agenda

The Chair presented the agenda and requested if there was any objection to unanimous approval of the agenda - hearing none the agenda was unanimously approved. The agenda had been sent to the members by email several weeks prior to the meeting.

J.4 Approval of Last Meeting Minutes

The Chair presented the minutes of meeting held in the Spring 2018 - Pittsburgh, Pennsylvania, USA on March 28th, 2018 and requested if there was any objection to unanimous approval of the agenda - hearing none the minutes was unanimously approved. The minutes had been sent to the members by email several weeks prior to the meeting. Wallace Binder made 1st motion to approve spring 2018 meeting, which was seconded by Dan Sauer.

J.5 Minutes from Working Groups and Task Force

The following WG and Task Force reports were received (the reports are appended later).

• TF to determine need for OLTC Field Test Guide	M. Ferreira
• TF on PCS Revisions to Test Code C57.12.90	H. Sahin
• TF on Audible Sound Revision to Clause 13 of C57.12.90	R. Girgis (B. Beaster)
• WG Guide for FRA for Liquid Filled Transformers C57.149	C. Sweetser
• WG on Loss Measurement C57.123	E. teNyenhuis
• TF on PCS Revisions to C57.12.00	T.Ansari (E. Betancourt)
• WG Shunt Reactors C57.21	S. Som
• WG on C57.18.10 Semiconductor Rectifier Transformers	S. Kennedy
• WG on HV & EHV (Breaker & Transformer) Transients C57.142	J. McBride
• WG Short Circuit Design Criteria C57.164	S. Patel
• WG on Amendment to Neutral Grounding Devices PC57.32a	S. Panetta

Below are highlights that were discussed at the PCS meeting:

1) **TF to determine need for OLTC Field Test Guide:**
   The task force came up with a Title and Scope for a field test guide for on-load tap changer. The title is “On-Load Tap Changer Diagnostic Field Testing Guide” and the scope was "Guide for diagnostic field testing of On-Load Tap Changers (OLTC) during tap change operation to assess their condition. This guide includes diagnostic testing methods for various OLTC types with results, analyses and interpretations." A vote was taken and the PCS agreed with the TF that they should prepare a PAR for submission to AdCom to put together a Working Group to develop the guide for evaluating on-load tap changers during operation.
   Marcos made a motion to create a WG to develop a document for field testing of on load tap changers. Raka Levi seconded the motion. Chair opened floor for discussion. Dan Sauer commented that scope is too narrow. Raka stated that this document would be a stand-alone. A straw ballot was conducted yielding 43 in favor of creating a PAR to develop document, 8 abstentions, and 2 negatives votes. The motion passed.
2) **TF on PCS Revisions to Test Code C57.12.90:**
   A straw ballot approved working in the TF minutes for changes in sections 8.7 (On-Load Tap Changer End to End Voltage Test) and 9.6 (On-Load Tap Changer End to End Current Test) of

the standard. The TF also reviewed clarified wording being considered for the "Winding resistance test requirement on wye connected transformers with neutral bushing brought out". The TF also reviewed and agreed to pass along this recommendation: "Revise the standards to say it is recommended that the insulating liquid used for service also be used for factory testing. In the case it is agreed by the user and manufacturer to not test with the same liquid type, it should be supported by calculation or experience"
There was a discussion about the correction of liquid temperature to accommodate for differences at high altitude. After some discussion, it was determined that this really belongs to the Insulation Life Subcommittee.
The final technical topic was a discussion on the OLTC continuity tests. After some discussion, it was agreed that this is a quality control test and does not fall under our responsibility for C57.12.90.

3) **TF on Audible Sound Revision to Clause 13 of C57.12.90:**
Prior to the meeting, a survey was issued to members of the Performance Characteristics Subcommittee for comments on the TF revisions to Table 17 and Annex C in C57.12.00. Out of 43 returns, 41 were approvals w/w/o comments. All comments were discussed and the result was implemented.

4) **WG Guide for FRA for Liquid Filled Transformers C57.149:**
This was the first meeting, and volunteers stepped forward to lead the review of specific sections of the document.
1. Scope/Application – Steve Schappell (SPX Transformer Solutions)
2. FRA Test Parameters – Peter Werelius (Megger)
3. Making an FRA Measurement – Diego Robalino (Megger)
4. Test Records – Alex Kraetge (Omicron)
5. Analysis & Interpretation
   - Mario Locarno (Doble)
   - Luiz Cheim (ABB)
   - Hemchandra Shertukde (UHart)
   - Peter Werelius (Megger)
6. Appendix: FRA Theory – Mark Lachman (Doble)

Malia will work with Chuck to get the MS Word version of the current document to enable effective editing.
Data is a key for this WG, and Proovi Patel and James Cross are going to work together to develop a template to ensure consistent gathering of data.

5) **WG on Loss Measurement C57.123:**
Draft 4 of the standard was reviewed at the meeting. All chapter assignments are complete except for Chapter 7. A commitment was made by Reto Fausch to complete the review of chapter 7 and send them to the chair before Anaheim for incorporation into the next draft of the standard. Also, a statement is being developed to cover the impact of core steel coatings that are different for distribution and power transformers. It was approved for the chair to survey PCS before the next meeting, once these updates are incorporated. The guide should be ready for ballot after discussion at Anaheim.

6) **TF on PCS Revisions to C57.12.00:**
There was a discussion about the language of Table 17 in the section about the load loss testing. A motion was made and approved and later withdrawn about clearing up the language related to the rated/maximum kVA for the test. A discussion also occurred on the tolerances for the transformer ratio and Hakim Shamoun will prepare a statement before the next meeting to make this tolerance statement clearer.

7) **WG Shunt Reactors C57.21:**

This standard and the current PAR for this group will expire at the end of the year. In September a 2 year PAR extension was submitted by the Chairman. Draft 4 of the standard was circulated with a good response from the membership with more than 2/3 of the members voting. A CRG is in place to resolve all the issue, which are documented in detail in the WG's minutes.
Sanjib made a motion to take the revised draft to the subcommittee for procedural vote, which was seconded by Dan Sauer. The motion was unanimously approved.

8) **WG on C57.18.10 Semiconductor Rectifier Transformers:**
This Working Group was not able to achieve a quorum. Draft 4 revisions were reviewed with the members present.
9) **WG on HV & EHV (Breaker & Transformer) Transients C57.142:**
Extensive discussions about the transformer/breaker interaction were held. A review of both calculation as well as physical construction (such as shields) methods of dealing with the transients took place. Also, the minutes will contain a summary of locations and conference where the topic is being discussed occurred. There are still editing changes in the current draft that will be brought to the Anaheim meeting.
10) **WG Short Circuit Design Criteria C57.164:**
A presentation on short-circuit testing was given by Shankar Subramany from the KEMA Laboratories. It was agreed that 1.0 per-unit of nominal system voltage should be used versus 1.05 that was in the previous draft, unless specified otherwise.
11) **WG on Amendment to Neutral Grounding Devices PC57.32a:**
This WG did not meet in their allocated slot here in Jacksonville. The last meeting of the WG was a virtual meeting that took place on September 5th and in those minutes they announced the next meeting would be here in Jacksonville. Unfortunately they did not take advantage of face to face meetings here. They have balloted changes developed as an amendment to C57.32, and were quite challenged for the need for a supermajority. The changes for CRG requirements should allow this WG to complete their task by or at the Anaheim meeting.

J.6 Unfinished (Old) Business

None

J.7 New Business and Motions

PC57.32.10 Neutral Grounding Reactors Guide - Ulf Radbrandt

This is an entity Working Group that will be having its first meeting in Anaheim. Ulf made a motion to create TF to develop neutral grounding reactor guide. Motion was seconded by Mike Sharp. Motion was withdrawn.

J.8 Minutes of Meetings of Working Group (WG) and Task Force (TF) Reports (all unapproved)

J.8.1 PCS Task Force on OLTC Diagnostics

Performance Characteristics Subcommittee
IEEE / PES Transformers Committee

October 15th, 2018 9:30AM
Hyatt Regency hotel Jacksonville Florida, USA

UNAPPROVED MINUTES

The PCS Task Force on OLTC testing / diagnostics met on Monday, October 15th 2018. The Chair Marcos Ferreira called the Group to order at 9:30am and explained purpose and scope of the TF. There were 71 guests and 24 members present. Group has 45 members so we had the quorum; 22 guests requested membership. Task force officials were Marcos Ferreira the chair, Raka Levi the vice-chair and Roger Fenton as interim secretary.

The motion to approve the agenda was initiated by Drew Welton and seconded by Jon Heron. No discussion took place and agenda was approved unanimously with no comments or amendments.
Motion to approve the minutes of last meeting was initiated by Ed teNyenhuis and seconded by Jon Heron. No discussion took place and minutes was approved unanimously.
Agenda Items were covered as follows.
Chair reminded the group this TF determined that “a guide is needed” at the last meeting and our task today is to define the title and the scope of the proposed future work.
The group discussed the title and its wording. After further discussion the motion was proposed by Marc Foata and seconded by Peter Werelius to have the following title:
“On-Load Tap Changer Diagnostic Field Testing Guide”
The vote for this title proposal was 15 for and 7 against, with 3 abstained. The title was approved.
During this discussion, a motion was proposed by John Herron to work on two test methods only: DRM and VAM. Following a vote with 13 against and 12 for, the proposal was rejected.
John Herron mentioned that the scope is too broad and LTC testing is covered in the standard C57.152.
Many modifications were brought up for the SCOPE, and a final motion was proposed by Joe Foldi and seconded by Ed teNyenhuis:
"Guide for diagnostic field testing of On-Load Tap Changers (OLTC) during tap change operation to assess their condition. This guide includes diagnostic testing methods for various OLTC types with results, analyses and interpretations."
Following a vote with 22 for the proposal, 1 against and 1 abstained; the wording of the SCOPE was approved.
Vice-Chair requested the motion to present our decisions to the PCS subcommittee for initiating working group on a guide on OLTC diagnostics test. Motion was initiated by a Timothy Tillery and seconded by Joe Foldi. No discussion took place and decision was approved unanimously.
Meeting adjourned at 10:50AM.
Respectfully submitted by

Marcos Ferreira	Raka Levi	Roger Fenton
Chair	Vice Chair	Interim Secretary

J.8.2 Task Force on PCS Revisions to C57.12.90

Title: Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers

October 15, 2018, 11:00am-12:15pm
Hyatt Regency Jacksonville Riverfront
Meeting Room "Grand Ballroom 5"
Jacksonville, Florida USA
Chair: Hakan Sahin Secretary: Hamid Abdelkamel

The TF Chair called the meeting to order at 11:05am. Meeting attendees stood up and introduced themselves.
The chair went through a review of the purpose of the task force and the proposed agenda for the meeting.
There were 41 of the 68 TF members in attendance making this meeting "official" as a quorum of 60.3% was reached.
A total of 89 people attended the meeting of which 9 guests requested membership. Secretary will review whether or not membership requirements are met and will include in meeting minutes prior to spring 2019 meeting.

The chair asked if any changes needed to be made to the agenda or if anyone had new business. No new business was requested.

Bertrand Poulin made the 1st motion to approve the agenda, which was seconded by Dan Sauer. Fall 2018 agenda was approved.

Dan Sauer made 1st motion to approve spring 2018 meeting minutes, which was seconded by Bertrand Poulin. Spring 2018 meeting minutes were approved.

After approving the fall 2018 agenda and the minutes from the spring 2018 meeting, the task force moved on to old business, which is the LTC performance voltage test and current test to be included in future versions of C57.12.90.
The Chair gave about 5 minutes for those attending the meeting to read the below text in 8.7. Then the Cahir showed the text for section 9.6.
8.7 On-Load Tap Changer End to End Voltage Test
In order to verify the performance of a transformer that has an on-load tap changer (OLTC), the OLTC shall be operated through one end to end to end (from one extreme tap to the other extreme tap and back) with the transformer energized at rated voltage with minimum control and motor voltage of 85%. For safety, the OLTC shall be fitted with and connected as for service including protective devices and must not be operated manually. The test may be performed at intervals, if necessary, such as to adjust the test circuit, but it is a requirement that the transformer be energized at no less than rated voltage corresponding to each tap to be changed and the applied voltage can be adjusted to the rated voltage of the tap position. The transformer shall be observed during this test and the operator shall identify that the sound during the tap changing operations was either normal or abnormal. Note that with some types of tap changers, there will be abnormally loud sound if components are not assembled properly. The transformer will have passed this test if the tap changer operates normally with no abnormal sound and no abnormal observations in the test control system such as a trip of the test circuit. Oil samples shall be taken from the OLTC compartment of vacuum type tap-changers before and after the test and analyzed for dissolved gasses. Results of the analysis may show some increase of dissolved gases due to current commutation,

resistor heating and / or stray-gassing of the oil. For mineral oil filled vacuum OLTCs, the increase of the sum of H2, CH4, C2H6, C2H4 and C2H2 should not exceed 12 ppm for in-tank type OLTCs and 6 ppm for compartment type OLTCs. For non-vacuum type OLTCs or OLTCs filled with a liquid other than mineral oil, the determination of abnormality is through sound only and there is not a limit for increase in gases.
Note: During the operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

9.6 On-Load Tap Changer End to End Current Test
In order to verify the performance of a transformer that has an on-load tap changer (OLTC), the OLTC shall be operated through one end to the other end (from one extreme tap to the other extreme tap) with the transformer current corresponding to the top nameplate MVA rating with minimum control and motor voltage of 85%. For safety, the OLTC shall be fitted with and connected as for service including protective devices and must not be operated manually. The test may be performed at intervals, if necessary, such as to adjust the test circuit, but it is a requirement that the transformer current shall not be less than 80% of the top MVA nameplate current for each tap change. The transformer shall be observed during this test and the operator shall identify that the sound during each tap changing operations was either normal or abnormal. Note that with some types of tap changers, there will be abnormally loud sound if components are not assembled properly. The transformer will have passed this test if the tap changer operates normally with no abnormal sound and no abnormal observations in the test control system such as a trip of the test circuit. Oil samples shall be taken from the OLTC compartment of vacuum type tap changers before and after the test and analyzed for dissolved gasses. Results of the analysis may show some increase of dissolved gases due to current commutation, resistor heating and / or stray-gassing of the oil. For mineral oil filled vacuum OLTCs, the increase of the sum of H2, CH4, C2H6, C2H4 and C2H2 should not exceed 12 ppm for in-tank type OLTCs and 6 ppm for compartment type LTCs. For non-vacuum type OLTCs or OLTCs filled with a liquid other than mineral oil, the determination of abnormality is through sound only and there is not a limit for increase in gases.
Note: During the operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

The Chair then stated that he reviewed all comments he received and incorporated as much as he could to produce the aforementioned clauses (8.7 and 9.6).
The Chair conducted a straw ballot and the majority accepted 8.7 and 9.6 as shown above.
The Chair showed the text (below) final version of "Winding resistance test requirement on wye connected transformers with neutral bushing brought out" for information only.
"For the wye windings, the reported resistance measurement may be from terminal to terminal or from terminal to neutral. When there is a neutral bushing brought out, at least one terminal-to-neutral measurement must be made at rated tap position and reported. For the reported total winding resistance, the resistance of the lead from the neutral connection to the neutral bushing may be excluded. For the terminal-to-terminal measurements, the total resistance reported is the sum of the three measurements divided by two."

After that the Chair moved on to discuss new business items.
New Business #1 – Using the same oil for testing by Steve Schroeder , Ed teNyenhuis

- During the Fall 2017 meeting a new business was brought up by Steve Schroeder requesting that the Insulating Liquid used for service also to be used for factory testing
- This new business was addressed in the Task Force Meeting for Insulating Liquid for Factory Testing during the Spring 2018 with the below agenda:

- Technical Overview by Patrick McShane & Alan Sbravati of impact of using different insulating liquid for first impregnation & factory testing versus insulating liquid used for design / service
- Manufacturing impact for having an extra insulating liquid service in factory (extra cost?)
- Utility perspective
- Final discussion
- Motion / vote on path forward

- The TF decided the below:
- "Revise the standards to say it is recommended that the insulating liquid used for service also be used for factory testing. In the case it is agreed by the user and manufacturer to not test with the same liquid type, it should be supported by calculation or experience"
- At PCS it was agreed to send this to our TF to implement into C57.12.90. It is suggested for this recommendation to go in the following 2 sections as:

10.1.5.3 Assembly

Transformers, including bushings and terminal compartments when necessary to verify air clearances, shall be assembled prior to making dielectric tests. However, assembly of items that do not affect dielectric tests, such as radiators and cabinets, is not necessary. Bushings shall, unless otherwise authorized by the purchaser, be those to be supplied with the transformer.

It is recommended that the insulating liquid used for service also be used for factory dielectric testing. In case it is agreed by the user and transformer manufacturer to not test with the same liquid, it should be supported by calculation or experience.

11. Temperature-rise tests

A temperature-rise test is defined as a test to determine the temperature rise above ambient of one or more of the transformer's windings, as measured at the terminals. The result for a given terminal pair or winding is the average value of the temperature of the entire circuit; it is not the temperature at any given point in a specific winding. The term *average temperature rise* refers to the value determined by measurements on a given terminal pair of the winding. It does not refer to the arithmetic average of results determined from different terminal pairs of the transformer.

See 4.1.2 and 5.11.2 of IEEE Std C57.12.00-2015 for conditions under which temperature limits apply. All temperature-rise tests shall be made under normal (or equivalent to normal) conditions for the means of cooling, as follows:

a) Temperature-rise tests shall be conducted on transformers that are completely assembled and filled to the proper liquid level.

b) Temperature-rise tests shall be made in a room that is as free from drafts as practicable; defined as a wind speed of 0.5 m/s, or less.

c) When it is not possible or practical to test the transformer as a completed assembly, the transformer shall be tested with the components required to replicate normal means of cooling the transformer during temperature-rise tests. When the transformers are equipped with thermal indicators, bushing current transformers, or the like, such devices shall be assembled with the transformer.

It is recommended that the insulating liquid used for service also be used for the temperature rise test. In the case it is agreed by the user and transformer manufacturer to not test with the same liquid type, it should be supported by calculation or experience.

Bertrand Poulin recommended clarify meaning of same oil. He also recommended to change it to type of oil.
Steve Schroeder explained that type would mean using inhibited vs. non-inhibited oil, etc.
A question was asked for reason behind new businesses above? Answer was to make sure transformers are tested with specified oil type.
Steve Antosz asked why separate temperature rise test, short circuit, and dielectrics and why not put them in the general section.
Ajit Varghese requested that new businesses above are addresses in sections where they do not cause any conflict.
Steve Antosz recommended to verify where each clause would fall under. Steve Anotsz will figure out which clause or subcommittee aforementioned new businesses would belong to.
The Chair moved on to new business#2
New Business #2 – Number of Short Circuit tests Clause 12.3.4 by Shankar Subramany
Shankar states the following:
There is a confusion on the number of tests to be performed while applying the 1.5 method on a 3 phase transformer as well as single phase testing of a single phase transformer.
Shankar has a detail presentation which was presented by him during the spring 2018 meeting in WG PC57.164, which was agreed that it did not belong there and to be reviewed as a new business in our TF.

12.3.4 Number of tests

Each phase of the transformer shall be subjected to a total of six tests satisfying the symmetrical current requirement specified in 12.3.1 or 12.3.2, as applicable. Two of these tests on each phase shall also satisfy the asymmetrical current requirements specified in 12.3.3.

The Chair showed Shankar Subramany's summary below.

Test lab interpretation of number of tests – 3 phase tests

Test number	1	2	3	4	5	6	Total tests per phase
Phase 1	Asym	Asym	Sym	Sym	Sym	Sym	6 per phase
Phase 2	Sym	Sym	Asym	Asym	Sym	Sym	6 per phase
Phase 3	Sym	Sym	Sym	Sym	Asym	Asym	6 per phase

Asym	Required peak current (100%)
Sym	Symmetrical or reduced peak current (100%)

The 1.5 phase method results in similar mechanical stresses as full 3-phase testing at the critical instant of asymmetrical current peak.

Test lab interpretation of # of tests – 1.5 method, **should we add 4 tests per phase, 100% Sym, making it a total of 18 tests to the above table?**

Test lab interpretation of # of tests – 1-phase test on 1-phase transformer, **How to distribute the two asymmetrical tests over Max., Nominal and Min tap positions?**

Short circuit test requirements IEEE vs IEC – 1 phase test, **Should IEEE also specify 3 x Asym tests, one in each f the extremes and the nominal tap for both three-phase and single-phase transformers?**

Group agreed that this is a valid new business and the TF to continue working to rewrite the clause.

The Chair showed New Business #3 – Altitude correction, clause 11.4.2 by Steve Schroeder

11.4.3 Correction of liquid temperature rises for differences in altitude

When tests are made at an altitude of 1000 m (3280 ft) or less, no altitude correction shall be applied to the temperature rises.

When a transformer tested at an altitude less than 1000 m (3280 ft) is to be operated at an altitude above 1000 m (3280 ft), it shall be assumed that the liquid temperature rise will increase in accordance with Equation (32):

$$\Delta\theta_A = \Delta\theta_o \left(\frac{A}{A_o} - 1 \right) F \qquad (32)$$

where

$\Delta\theta_A$ is the increase in liquid temperature rise (°C) at altitude A meters (ft)
$\Delta\theta_o$ is the observed liquid temperature rise (°C)
A is altitude meters (ft)
A_0 is 1000 m (3300 ft)
F is 0.04 for self-cooled mode or 0.06 for forced-air-cooled mode

NOTE—Winding temperature rise above liquid temperature is not affected by altitude.

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$\Delta\theta_o$ is the observed liquid temperature rise (°C)
A is altitude meters (ft)
A_0 is 1000 m (3300 ft)
F is 0.04 for self-cooled mode or 0.06 for forced-air-cooled mode

NOTE—Winding temperature rise above liquid temperature is not affected by altitude.

After a short discussion, it was decided that this new business belongs to insulation life SC.
However, Chair agreed to fix the typo in the above sections where 1000 m shown as (3280 ft) and then in the formula as (3300 ft)
The Chair moved to New Business #4 – OLTC Continuity tests by Kushal Singh

For reactance type OLTCs where a reactor (Preventive auto transformer) is used, in order to verify that the preventive auto leads are connected correctly, Kushal requests our TF to add the continuity test, crossed PA lead test, also known as "flicker" test.
The Chair and the group decided not to pursue this new business since it is more of quality check.
The Chair also shared another new business question from Toni Franchitti about another field diagnostic LTC continuity test as following:
"Continuity test during routine diagnostic testing, in which the voltage at the output is monitored by an analog meter and the tap changer is moved from one extreme to the other".
Chair and the group agreed also that this is a quality control test and does not belong in C57.12.90.
The meeting was adjourned at 12:15pm.

J.8.3 TF Audible Sound Revision to Test Code C57.12.90

Title: Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers
Jacksonville, Florida

The TF met at 1:45 PM, on Monday, October 15, 2018. Mats Bernesjo presided over the meeting in the absence of Chairman Ramsis Girgis. Secretary Barry Beaster assisted with the administrative duties.

After the Spring 2018 meeting, the membership was adjusted to 46 members. This meeting was attended by 25 of the 46 members and 55 guests for a total of 80 persons. A quorum was established, but not until after the final attendance was recorded in the AMS system. During the meeting, a call was made for any objections for a tentative unanimous approval, no objections were raised so we have a post meeting official approval of the Spring 2018 TF minutes. The unapproved agenda was presented with a change in the Sound Abatement discussion being set aside until the next meeting. There were six requests for TF membership; which will be reviewed based on previous meeting attendance.

Member Mats Bernesjo presided over the technical portion of the meeting.

Prior to the meeting, a survey was issued to members of the Performance Characteristics Subcommittee for comments on the TF revisions to Table 17 and Annex C in C57.12.00.

The first technical Agenda item presented was a summary of the returns of the aforementioned survey. There was a total of 43 returns. The breakdown is; 33 approved with no comments, 8 approvals with comments, one not approved, and one abstain. The chair of the TF replied to each of the comments via email prior to the meeting addressing all comments received. Agreed upon changes / additions to Table 17 and Appendix – C resulting from this Survey were presented in the meeting and they were all accepted by TF members. In discussing whether to use the words "Full MVA Rating", or "Top MVA Rating", or "Maximum MVA Rating" in the note below Table of Appendix C3 for load noise, it was suggested to use the words "Top MVA Rating".

An overview of the measured impact of the Tap position on Load Sound was presented. John Sen (Duke Energy) had a question on how the regulating winding was operating during load noise tests with all turns in vs. all turns out. Sanjay Patel (SMIT) clarified some of the results that he had previously provided to the TF in this area. The presenter shared with the meeting attendance the Chair's as well as his comments regarding these results and the observations made (that are in line with what was previously reported in this TF). No objections nor comments were raised regarding the proposed added sentence to C57.12.90 Clause 13.3.3.2 "***Note that load sound level experiences small changes with the tap position***"

Impact of temperature on core noise: Sanjay Patel commented that he had observed higher core noise levels vs. time for transformers operating at flux densities as low as 1.5 T, with lower quality coating materials. The presenter shared with the attendees that the proposed note to be added to C57.12.90 Clause 13.3.3.1 covers both lower quality coating materials as well as the lower flux density as "***this is more noticeable for high loss core steels at high flux densities***". No objections nor comments were raised.

On the impact of temperature on load noise, a question was raised from the audience whether the load noise measurements presented were made after the heat run was completed and the oil temperature was cooled down. The presenter shared that the measurements "after heat run" were made while the oil temperature was still high after the heat run. The presenter shared with the audience that the proposed added sentence to C57.12.90 Clause 13.3.3.2 ***"Note that load sound level experiences small increases or decreases after the heat run test (s) depending on the design of the transformer"*** considers that a small change may occur but would be within what is typically experienced. No objections nor comments were raised.

Subsequent to the meeting, the chairman of the TF decided to send a survey to the TF on the 3 added notes above related to the impact of temperature on both core & load noise and impact of tap position on load noise.

Steve Brzoznowski (BPA) asked the presenter how the sound measurements were performed, in particular the results presented on the relationship between ONAN, ONAF, and Fan sound. The presenter emphasized that the data presented are very accurate and the conclusions are accurate.

The agenda item on revising / overhauling the TR1 (C1) tables is planned for the spring 2019 TF meeting.

With no further discussion or comments, the meeting was adjourned at 2:30 PM.

Respectively submitted,

Barry Beaster, TF Secretary

J.8.4 WG Guide for FRA for Liquid Filled Transformers C57.149

Title: Guide for the Application and Interpretation of Frequency Response Analysis for Oil-Immersed Transformers

Meeting Date/Time: Oct. 15, 2018 1:45 PM
Meeting Location: Grand Ballroom 5 – Hyatt Regency Jacksonville Riverfront
Chairman: Charles Sweetser (OMICRON)
Vice-Chair: Poorvi Patel (EPRI)
Secretary: James Cross (Kinectrics)

Meeting was convened at 1:45 PM by Chairman Charles Sweetser (OMICRON) with 46 total attendees, consisting of 16 members and 30 guests.
The Chairman noted that several volunteers were going to be needed to support the WG and asked for a volunteer to be Secretary. James Cross (Kinectrics) volunteered and joined the podium.
The Chairman presented the agenda for the session, and the obligatory patent disclosure slides were discussed.
Charles Sweetser reviewed the scope and purpose of the guide and offered some thoughts on the work to be done by the WG. A key part of this working group will be to hopefully expand on the "Analysis and

Interpretation" section of the guide to take into account the progress in the field since the initial publication of the guide.
Patrick Picher was invited to make a presentation on the work done on the CIGRE SFRA bulletin A2.53, so that the group could better understand that team's approach to the topic, and possible collaborate.
Luiz Cheim (ABB) made a suggestion to use previously obtained SFRA data in the application of algorithms and machine learning techniques ("supervised learning") to obtain diagnoses from sample SFRA data.
Poorvi Patel (EPRI) noted that it is important to access other SFRA data sources from the WG members.
Alexander Kraetge (OMICRON) asked if the WG had the intention of harmonizing the IEEE and the IEC standards in this area.
Mario Locarno (Doble) noted that the intended audience of the guide is transformer "laymen" not necessarily the experts developing the guide, so the content should reflect this reality.
Transportation effects on SFRA were discussed in the context of whether there would/should be a cross-reference to the guide dealing with transformer transportation.
The chairman asked the group for volunteers to undertake review/re-writing of the major sections or "chapters" of the guide.
The following people offered to lead the sections as noted below:

1. Scope/Application – Steve Schappell (SPX Transformer Solutions)
2. FRA Test Parameters – Peter Werelius (Megger)
3. Making an FRA Measurement – Diego Robalino (Megger)
4. Test Records – Alex Kraetge (OMICRON)
5. Analysis & Interpretation
    - Mario Locarno (Doble)
    - Luiz Cheim (ABB)
    - Hemchandra Shertukde (UHart)
    - Peter Werelius (Megger)
    - Lachman (Doble)
6. Appendix: FRA Theory – TBD

Any new case studies correlated to SFRA data should be sent to Mario Locarno (Doble).
Malia Zamanat IEEE should be able to get us the final MS Word version of the guide to use as a basis for starting the re-write/edits.
Poorvi Patel (EPRI) and James Cross (Kinectrics) will work together to develop a template spreadsheet to gather SFRA data. Charles Sweetser (OMICRON) noted that the spreadsheet should be simple with a minimal number of data fields required (eg. Vector group; Voltage; Failure Mode)
Luiz Cheim (ABB) wanted enough data fields to be able to perform supervised machine learning analysis techniques.
Next meeting will take place during the Spring/2019 meeting session in Anaheim.
Peter Werelius (Megger) moved to adjourn at 2:51 PM.

J.8.5 Working Group C57.123 Loss Measurement Guide

Title: Guide for Transformer Loss Measurement

Jacksonville, FL – Oct 15, 2018

- The Working Group met at 15:15 in the Grand Ballroom 6 at the Hyatt Regency Hotel on Oct 15, 2018. This was the third meeting since receiving the PAR for revision of the guide. This guide was first published in 2002, revised in 2010 and there is now a PAR for revision that expires in 2021.

- The Chair, Ed teNyenhuis, led the meeting and recorded the minutes. The secretary, Anthony Franchitti, was not able to be at the meeting.

- The following persons were present:
  Ricardo Lopes
  Ed teNyenhuis (member)
  Vladimir Khalin
  Adnan Rashid
  Jarrod Prince
  Colby Lovins
  Jill Holmes
  Richard Simonelli
  Timothy Tillery
  Darren Brown
  Craig Stiegemeier (member)
  Dhiru Patel
  Nigel Macdonald
  Anirudhdhsinh Jhala
  Reto Fausch (member)
  Mats Bernesjo
  Joaquin Martinez
  Radoslaw Szewczyk
  Rogelio Martinez
  Piotr Blaszczyk
  Andy Steineman (member)

  - Four of the eight members were present. Therefore, a quorum was reached.

  - The Agenda was presented and a motion to approve the agenda was made by Craig Stiegemeier and seconded by Reto Fausch. There were no comments and the agenda was approved unanimously.

  - A motion to approve the meeting minutes was made by Andy Steineman and seconded by Craig Stiegemeier. There were no comments and the minutes were approved unanimously.

  - The Chair commented that all chapter assignments were completed except for Chapter 7. This included revisions by Dr. Eddy So that were recently received.

  - All changes to date have been incorporated into the Draft 4 and were reviewed in detail in the working group meeting.

  - Reto Fausch agreed to complete his review of the Chapter 7 and send his comments to the Chair.

  - Timothy Tillery agreed to provide comments to the Chair on the impact of core steel coating being different for distribution transformers versus power transformers.

  - It was generally agreed that the draft guide is nearly complete. A motion was made by Craig Stiegemeier and seconded by Reto Fausch to send the draft guide to the PCS for a survey prior to the next meeting. There were no comments and the minutes were approved unanimously. The Chair will thus send the draft guide to PCS and collect the comments prior to the next meeting

(Spring 2019 in Anaheim CA). It is expected that the guide will be ready for ballot after the next meeting.

NEW BUSINESS

- There was no new business to discuss.
- The meeting was adjourned at 16:10 with a motion by Craig Stiegemeier and seconded by Reto Fausch. There were no comments and the agenda was approved unanimously.

J.8.6 Task Force on General Requirements C57.12.00

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

Performance Characteristics Subcommittee
IEEE / PES Transformers Committee

October 15, 2018 4:45 PM
The Hyatt Regency Jacksonville Hotel
Jacksonville, Florida USA

UNAPPROVED MINUTES

The PCS Task Force on General Requirements for C57.12.00 met on Monday, October 15, 2018. The (acting) Chair Enrique Betancourt called the Group to order at 16:47 and reminded purpose and scope of the TF. According to paper roaster, **38** Members and **52** guests were present but hands counting indicated **44** members present. The RFID results were received, but the system was not identifying correctly the attendees who were members. The quorum was decided according to the hand count based on **85** members in Task Force membership and the Chair continued regular business with the Group. The following **8** guests requested membership:

Babanna Suresh	Southwest Electric Co.
Daniel Weyer	Nebraska Public Power District
David Walker	MGM Transformer Co.
Everton De Oliveira	Siemens Ltda
Jorge Cruz Cienfuegos	Partner Technologies Inc.
Kushal Singh	ComEd
Mario Alonso	Transformer Quality Consulting
Stephen Schroeder	ABB Inc.

The Pittsburgh (Spring 2018) minutes were approved by the Group (Akash Joshi/Hemchandra Shertukde), with no one opposed. The Agenda was approved by the group with minor amendments. Agenda Items were covered as follows.

1. NEW BUSINESS
   A. WG Item 110, Table 17: Daniel Blaydon (Baltimore Gas & Electric) proposed a clear definition of the "rated current" during load loss test.

   Discussion on the subject started in this meeting and was not concluded. The Chair presented the existing item on Table 17 and opened the floor for discussion.

Javier Arteaga proposed referring to rated kVA since it is defined but Dan mentioned it does not clearly say if it is maximum or minimum kVA.
Bertrand Poulin also agreed to add a statement to clarify the rated current since there are multiple rated currents the losses can be measured.
Pierre Riffon suggested to specify the rated current based on the kVA that the losses are guaranteed.
Ray Musgrove referred to C57.12.10 that clearly defines the base kVA rating as "The kilovoltampere rating of the transformer shall be based on its capacity at ONAN cooling stage" and proposed to assume rated current as the base kVA current.

Motion to revise the language of the Table 17 section about the load loss test was approved (Daniel Blaydon/Sanjib Som).
The meeting Chairman suggested Daniel Blaydon to prepare a clear statement and send it to the WG Chair for circulating among members before the next meeting. Daniel Blaydon withdrew the motion to provide a proposed clear statement and send it to the WG Chair, Tauhid Ansari.

B. As next new business, the Chair presented the request from Bipin Patel to add a statement on the nameplate that the transformer design is in compliance with Item 4.1.6.1 of C57.12.00.

Joe Foldi mentioned that the end user should provide the maximum operating voltage of the generator and nameplate is already indicating that the transformer is according to C57.12.00 so it is not necessary to add this statement.
Ryan Musgrove referred to Note "l" of the Table 6- Nameplate Information in C57.12.00: "The maximum value of primary voltage as indicated in 4.1.6.1."
According to this information, the proposal was not accepted for future discussion.

C. Hakim Shamoun proposed to add a new business for item 9.1 in C57.12.00, tolerances for ratio. He said %0.5 cannot be met when there are few turns in the regulating winding of a transformer with on-load tap changer. He would like to discuss revising it according to IEC tolerances that require %1 or less than $1/10^{th}$ of the transformer impedance.

Don Dorris commented that the impedance criteria could easily cause confusion for a test engineer during the evaluation of the results.

With no further comments from the meeting attendance, the Chair requested Hakim to prepare the proposed statement to and submit it to the WG Chair before the next meeting.

There was no other new business brought up from the attendance. With motion from Sanjib Som /Hemchandra Shertukde, the meeting was adjourned at 5:30 pm.

Respectfully submitted,

Enrique Betancourt
(acting) WG Chair

Cihangir John Sen
(acting) Secretary

J.8.7 WG Shunt Reactors C57.21

Title: Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA

Jacksonville, FL
Hyatt Regency Jacksonville Riverfront Hotel

Tuesday October 16, 2018

The working group met in the Grand Ballroom 2 & 3 (2) of the Hyatt Regency Jacksonville Riverfront Hotel on Tuesday October 16, 2018, at 9:30 AM.

The meeting was called to order at 9:30 AM by the Chairman Sanjib Som.

There were a total of 52 participants: 12 Members and 40 Guests out of which 7 Guests requested membership.

- The meeting was opened with the Chairman remarks and the circulation of attendance rosters.
- 12 of the current 16 WG Members were present and quorum to carry out business was met.

Meeting notes:

- **Meeting Agenda**
  - Meeting agenda, which was circulated among members and guests on October 2, 2018 by email, was presented to the audience.
  - There were no objections or comments and the agenda was approved unanimously.

- **Minutes from previous meeting**
  - The minutes from the S18 meeting in Pittsburgh, which were circulated on October 2, 2018 by email, were presented to the audience.
  - There were no objections or comments and the S18 meeting minutes were approved.

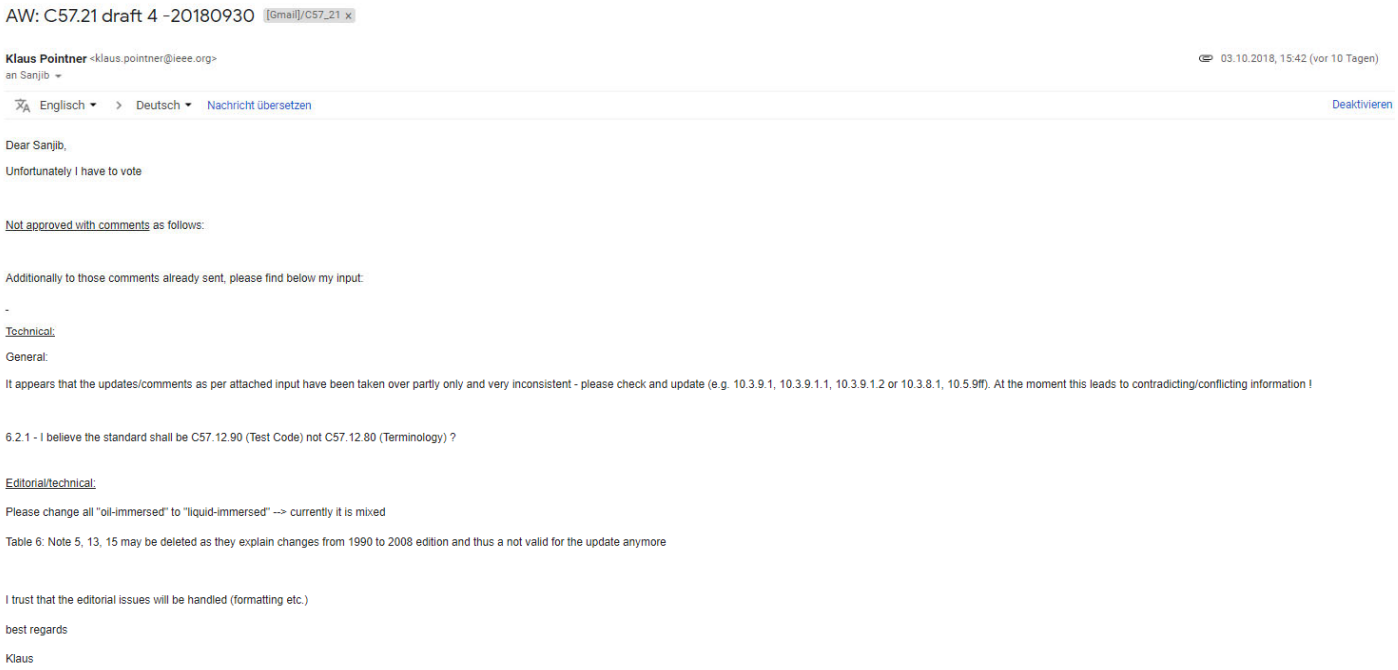
- **Unfinished Business:**

Document status:

- Par and standard expire on December 31 2018 and the standard will become inactive. A PAR extension for 2 years was submitted by the Chairman in September 2018.

- Draft 4 of the standard was circulated among the members for approval and comments.
- 13 responses to Draft 4 were received from the 15 current voting members. 9 responses received with approval with no comments there by achieving over 2/3 among members voting. The Chairman will take the Draft 4 to the PC Subcommittee. Returned comments relate to pending technical, editorial and document formatting changes. With the approved Draft 4 by the membership, next step requires approval by PCS.

- Yes with comments: Comments from Klaus Pointner:



AW: C57.21 draft 4 -20180930 [Gmail]/C57_21

Klaus Pointner <klaus.pointner@ieee.org> 03.10.2018, 15:42 (vor 10 Tagen)
an Sanjib

Englisch > Deutsch Nachricht übersetzen Deaktivieren

Dear Sanjib,

Unfortunately I have to vote

Not approved with comments as follows:

Additionally to those comments already sent, please find below my input:

-

Technical:

General:

It appears that the updates/comments as per attached input have been taken over partly only and very inconsistent - please check and update (e.g. 10.3.9.1, 10.3.9.1.1, 10.3.9.1.2 or 10.3.8.1, 10.5.9ff). At the moment this leads to contradicting/conflicting information !

6.2.1 - I believe the standard shall be C57.12.90 (Test Code) not C57.12.80 (Terminology) ?

Editorial/technical:

Please change all "oil-immersed" to "liquid-immersed" --> currently it is mixed

Table 6: Note 5, 13, 15 may be deleted as they explain changes from 1990 to 2008 edition and thus a not valid for the update anymore

I trust that the editorial issues will be handled (formatting etc.)

best regards

Klaus

- No with comments: Comments from Luc Dorpmanns:

I have checked with our test bay and we have a few remarks to the draft. I copied the guys in and also Christoph as he wrote the chapter about the noise measurements:

- Itemm9.2.4. note: tail time of switching impulse: change 1000 to 500 microseconds as in IEC (this is technically already a challenge)
- Item 10.3.4.: LI sequence: change to 1x RFW, 1x FW, 2x CFW, 2x FW (as in C57.12.90 and IEC).
- Item 10.6.3: insufficient test power: the remark in line 20-21 is contradicting the part before. And also the behaviour is highly non-linear so extrapolation is for some designs not feasible.
- Item 10.6.5: Sound pressure measurement: As mentioned before we have a preference for sound intensity method and this could be included in the standard. If a test transformer is used inside the same test bay this method should be used to rule out the noise of the test transformer.
- Item 10.6.6.: lines 30-34: Maybe it is clearer to include the PI-index here and give a guidance on that too?
- Item 10.6.6.: lines 41-43: this only works if the noise of the test transformer is about the same as of the reactor (or lower): in case the noise of the test transformer is much more than the reactor this correction will not make sense. Some remark our limit should be added.

- Yes with a question: Comment from Hemchandr Shertukde, to be addressed during balloting process:
  Shertukde, Hemchandr shertukde@hartford.edu via hartford0.onmicrosoft.com

to Dharam, Klaus, Sanjib, a.delrio@ieee.org, ebetanco@ieee.org, arup.chakraborty@deltastar.com, l.dorpm

Yes, I had provided some query which does not seem to satisfy me.
Best
Hem

- Comment by Enrique Betancourt (voted yes) but noted that some sections of text in the standard is repeated information and changes will be required to address the issue. The Chair indicated that those changes will be done during the next revision of the standard.

- No with comments from Christoph Ploetner (see below)

*******Comments from Luc on Draft 4 (blue) and comments on same by Christoph*******

I have checked with our test bay and we have a few remarks to the draft. I copied the guys in and also Christoph as he wrote the chapter about the noise measurements:

- Itemm9.2.4. note: tail time of switching impulse: change 1000 to 500 microseconds as in IEC (this is technically already a challenge)

- Item 10.3.4.: LI sequence: change to 1x RFW, 1x FW, 2x CFW, 2x FW (as in C57.12.90 and IEC).

- Item 10.6.3: insufficient test power: the remark in line 20-21 is contradicting the part before. And also the behaviour is highly non-linear so extrapolation is for some designs not feasible.

I agree, the sentence

"Tests at lower voltage levels are not qualified for extrapolation."

can be misunderstood and I suggest to delete the sentence it without replacement as it is not really needed.

Hereafter a re-phrased wording for lines 18-25 that puts a little more emphasize on manufacturer's obligation in case of reduced testing...

When the available test power is insufficient for testing at 1.05 pu nominal system / rated voltage, then the manufacturer shall notify the user of reduced voltage testing during the proposal stage and the reduced voltage test level agreed upon at the time of contract. It is the manufacturer's obligation to demonstrate to the user's satisfaction that reduced-voltage testing produces sufficiently accurate results when extrapolated to the required test voltage. The minimum permissible test voltage is set to 0.9 pu nominal system / rated voltage. ~~If a sufficient accurate extrapolation cannot be demonstrated to the user, a field test may be performed, subject of agreement between manufacturer and user at the time of contract.~~

I stroked out the last sentence as I do not really see it as an option for a reliable measurement (It came from the old version). Up to the group to decide in Jacksonville on it! Please consider to exchange theses new wording with lines 18-25 in Draft4.

We all know that reduced testing is not desirable and I have no problem to entirely remove this possibility. Historically it was justified to have this possibility because test power was widely an issue. Nowadays this has definitely changed worldwide and removing this possibility would affect probably only a few cases. And even such cases are not necessary to have because

there is sufficient competition available for all reactor ratings such that there is no commercial issue by having for instance too few venders capable doing full testing. However, it would be a huge step and I think it must be well agreed amongst the WG members at first and secondly also confirmed by the subcommittee. Maybe we do this better during next revision.

In terms of non-linearity, I do not suggest to start a discussion on technical limits for the extrapolation at this stage of revision. Let us consider and discuss during next revision – it will take too much time.

- Item 10.6.5: Sound pressure measurement: As mentioned before we have a preference for sound intensity method and this could be included in the standard. If a test transformer is used inside the same test bay this method should be used to rule out the noise of the test transformer.

C57.12.90:2015 defines two quantities for sound level reporting: Sound pressure and Sound power. It fully independently further defines two methods for sound measurements – the sound pressure method and the sound intensity method. The returned results from both methods are applicable for sound pressure and sound power reporting. The selection of the measurement method is on manufacturer's side, if not specified by the user. Therefore: The proposed wording entirely follows C57.12.90:2015 and no changes shall be made to the proposed wording. FYI: I intend to modify IEC 60076-10 likewise during next revision. IEEE C57.12.90:2015 approach is physically better.

- Item 10.6.6.: lines 30-34: Maybe it is clearer to include the PI-index here and give a guidance on that too?

Same as before. No need to modify as limits for the intensity method using the PI-index are well described in C57.12.90:2015

- Item 10.6.6.: lines 41-43: this only works if the noise of the test transformer is about the same as of the reactor (or lower): in case the noise of the test transformer is much more than the reactor this correction will not make sense. Some remark our limit should be added.

Yes this is correct. There are limits for the application of this method and the limits are given in the provided reference clause of C57.12.90:2015. Such are more stringent than suggested here. If we would allow the same sound level for the background noise and for the reactor noise, than we would overrule C57.20.90. If the WG wants to do this for this specific case in order to enable a wider applicability – technically it is justified – then we should add following sentences after line 44 of clause 10.6.6:

The application of this method is technically justified for a sound level difference between average background sound pressure level and total sound pressure level of 3 dB or more, although in clause 13.5.5.2 of IEEE Std. C57.12.90:2015 a minimum difference of 5 dB is stated. For the extended range of application it yields: For a 3 dB sound level difference, the correction to be added to the total sound pressure level is -3 dB and for a 4 dB difference it is -2.2 dB.

**********LUC's comments and comments on same by Christoph*******

- The CRG is now set in place by the Chairman.
- Changes to the WG Officers were introduced:

- Vice Chair: Arturo Del Rio (a.delrio@ieee.org)
- Secretary: Kris Zibert (kris.zibert@amce.com)

No new businesses were presented at the meeting.

A motion to adjourn the meeting was proposed by Mat Weisensee, seconded by Enrique Betancourt. Meeting was adjourned at 10:05 am.

Next meeting: Spring 2019, Anaheim, CA, March 24-28, 2019.

Respectfully submitted,

Chairman: Sanjib Som (ssom@patransformer.com)
Vice Chair: Arturo Del Rio (a.delrio@ieee.org)
Secretary: Kris Zibert

J.8.8 Working Group on Semiconductor Power Transformers – C57.18.10

Title: Standard Practices and Requirements for Semiconductor Power Rectifier Transformers
Unapproved Meeting Minutes
Hyatt Regency Jacksonville Riverfront, Jacksonville, FL
Grand Ballroom 2 &3
11:00 am, October 16, 2018

The Working Group met in the Grand Ballroom 2 & 3 meeting room

Sheldon Kennedy called the meeting to order at 11:01am

There were 14 members and 22 guests present. A quorum was not present (14 of 30 members).

The patent call was given. Nobody replied with any patent issues.

Discussion of Draft 4 Revisions:

Sheldon went over the changes in Draft 4. Nothing on interphase transformers is in the Draft. Sheldon volunteered to write something. John John also volunteered to submit some information about interphase transformers. Added high resistance grounding, non-classical harmonics to previous draft. High frequency switching was brought up in previous meeting by Phil Hopkinson but he did not submit anything. Sheldon will ask Phil to write something on this topic. Made changes to scope of standard and added some references. Discussed adding comments on the short circuit performance of rectifier transformers which are different than standard transformers because there can be multiple secondaries. Added more information on electrostatic shields. Sheldon asked audience to submit any comments on the draft to one of the officers. Nothing added yet about impulse testing of rectifier transformers. Traction overload specification has incorrectly been listed as 200% for heavy traction rather than the correct 300%. This will be corrected. Sanjib Som mentioned that there might be excess CO and CO2 generated if the temperature exceeds 120C during traction overload testing and that it should be mentioned in the standard. Sanjib will write something about it. Casey Ballard volunteered to send in information about C57.154 on high temperature insulation systems in liquid filled transformers and how it might be related to gassing mentioned by Sanjib. Sheldon asked the audience if there were any new

topics to be addressed in the revision. Nobody replied. Sheldon will incorporate the changes into the Draft and send it out for a Working Group ballot.

New Business:

- No new business

With no further business, the meeting was adjourned at 11:42am.

The Working Group will meet again at the Spring 2019 meeting in Anaheim, CA

Chairman: Sheldon Kennedy

Vice Chairman: Bill Whitehead

Secretary: David Walker

J.8.9 Working Group for the revision of C57.142

Title: Guide to Describe the Occurrence and Mitigation of Switching Transients Induced by Transformers, Switching Device, and System Interaction

Jacksonville, Florida
Tuesday, October 16, 2018
3:15 PM – 4:30 PM
Grand Ballroom 5

Chairman – Jim McBride
Vice Chair – Xose Lopez-Fernandez
Secretary – Tom Melle

1) Meeting called to order at 3:15 PM

2) Welcome and Chair's Remarks

3) No essential patent claims made

4) Circulation of Attendance Sheets
82 Attendees were present (51 Guests)
31 of 56 Members present (quorum was achieved at 4pm)

5) Approval of Agenda without objection.
6) Approval of meeting minutes from Spring 2018 without objection.

7) Mitigation Methods Task Force Update – Phil Hopkinson

Phil Hopkinson spoke about past transformer failures in the field that were not able to be reproduced in the laboratory.

The presentation included a discussion of series resonance in the field. Leakage reactance and magnetizing reactance (series capacitance and series reactance) may not be excited by laboratory impulse tests.

In the past, EHV reactors that were failing in the field were passing factory test levels. Mitigation methods with some success have included: higher BIL, open terminal special impulse test, and fast-front switching surge with a long tail time.

Switching devices are the likely "culprit" as the switch operations have become faster over time. The energy following a strike/restrike tends to move back-and-forth between the internal inductance and capacitance. One of the primary defenses against this phenomenon are 'snubber circuits' which can help to dampen the oscillations.

Phil reminded the WG that many old transformers had electrostatic shields. Line shields increase series capacitance and greatly reduce capacitance to ground. In the past (for 34.5 kV and below) static shields added to the winding seemed to increase probability of surviving re-strikes

Shielding solves many issues with series resonance and is relatively easy to apply. The conclusion is that increasing the series capacitance and reducing the capacitance to ground should improve the design. Phil urged the group to focus on improving transformer designs and developing new test methodologies. Advanced modeling may also be necessary in order to mitigate these issues.

The Chair added that more communication is required between the end-user of the transformer and the manufacturer with regard to the potential for exposure to high-energy transients in the field. Multiple mitigation methods are being discussed and will be addressed in the Guide.

Discussion of Transient Analysis programs by Akashi Joshi.

8) The IEEE Switchgear Committee Meeting was held April 22nd – 26th, 2018 in Lake Buena Vista, FL. The C57.142 WG provide an update at the meeting on Tuesday, April 24th, 2018 from 2:00pm – 6:00pm. The meeting was held with 49 people present, 11 present requested attendance to the WG. Dave Caverly of Trench Limited has agreed to be the liaison between Switchgear and Transformers committees

9) CIGRE meetings were held in Rio de Janeiro, Brazil – April 9-12, 2018. On April 9th -11th - JWG A2/C4.52 HF Transformer Modeling met.
On April 12th - CEPEL held a workshop on High Frequency Transient Measurement

CIGRE Biennial was held in Paris, France – August 26-31, 2018. Topics included group Discussion for Transformers and Reactors including Transformer Modeling and Transformer Impulse Testing

10) Status of Current Draft and Comments:
Phil Hopkinson commented that transformer failures can occur as a result of breaker openings or closings. The Chair added that reignition can cause severe issues as well and that limiting/preventing re-strike/re-ignition by different methods during reactor switching is being studied by several other groups.

Review of C57.142 Draft 4 – The Chair noted that some editorial changes have been included, however, there may be additional editing / cleanup needed. Much of the material from the task force paper and the neutral grounding material have been included in Draft 4. The chair requested that the membership please review and comment on the existing draft in the next few weeks if possible.

Phil Hopkinson made a comment about (capacitor bank) switching control / disconnect switch transients as a mitigation method. This mitigation method is included in the present draft Annex 5 Example 5.

11) New Business: none

12) Next Meeting: (Anaheim, California)

13) Adjournment at 4:30 PM without objection

J.8.10 WG PC57.164 Short Circuit Withstand Guide

Title: Guide for Establishing Short Circuit Withstand Capabilities of Liquid Immersed Power Transformers, Regulators, and Reactors

Sanjay Patel: Chair
Raj Ahuja: Vice Chair
Joe Watson: Secretary

The WG met at 4:45 PM on October 16, 2018 with 54 attendees, including 21 of 54 WG members, so a quorum was not reached. A quorum was not reached at the previous meeting as well.
The meeting attendance was reviewed after the meeting and the status of 23 Members who did not attend the Pittsburgh or Jacksonville meetings were changed to Guest status. With the new Members added and previous Members changed to Guests, the WG now has 42 Members. An email ballot will be issued to the revised Members to approve the minutes of this meeting and the previous meeting.
No essential patents were revealed by any of the attendees when the question was raised.
The document is in the final stages of development. There were a few items discussed to add to the next Draft.

- Zig-zag transformer models will be developed and added to the circuit models in Section 4. Joe Watson volunteered to develop these models.
- After much discussion, it was agreed that an Appendix will be added for a discussion on calculating mechanical forces from the calculated fault currents and physical dimensions. The transformer supplier will be solely responsible for calculating the mechanical forces with their design programs and detailed design information, but the guidance in the Appendix will include information on the general theory and will provide users with methods on estimating the forces with general design information. Dr. Muhammad Ali Masood Cheema volunteered to provide material and help develop this Appendix.

The next Draft is expected to be ready by the end of the year and will be sent out to the WG for a straw ballot with the results to be discussed at the next meeting with the document sent to IEEE for balloting after resolution of the straw ballot comments.
The WG plans to meet in Anaheim next spring with a similar number of attendees.

J.8.11 WG on Neutral Grounding Devices PC57.32a

Title: Standard for Requirements, Terminology, and Test Procedures for Neutral Grounding Devices Amendment: Neutral Grounding Resistor Section

IEEE C57.32a Amendment

Sept 2018 WebEx Meeting

Thursday, Sept 6, 2018

9:00 AM – 11:17 AM

Chair – Sergio Panetta

Vice Chair – Yann Elassad

Secretary – Thomas Yingling

Call to Order

Patent Announcement

Quorum: Attendance by roll call

The committee has 16 voting members, 15 were present:

1.	Sheldon Kennedy: Niagra Transformer	Present
2.	Sergio Panetta: I-Guard/Telema	Present
3.	Yann Elassad: MS Resistances	Present
4.	Bernard Audouard: MS Resistances	Present
5.	Tom Yingling: Powerohm Resistors/Hubbell	Present
6.	Ed teNyenhuis': ABB	
7.	Sinan Balban: Ozdirenc	Present
8.	Federico Turner: MegaResistors	Present
9.	Richard Field: Post Glover/Telema	Present
10.	Stuart Gibbon: Post Glover/Telema	Present
11.	Edmundo Perich: I-Guard/Telema	Present
12.	Bob Berger: Post Glover/Telema	Present
13.	Pablo Sanchez: Controle Servicios	Present
14.	Todd Locker: Mosebach/Telema	Present
15.	Lodovico Mascardiv: Telema	Present
16.	Sedat Corapsiz: Hilkar Elektrik	Present

Andrew Keith has resigned from the committee.

Onesimo Sanchez was a guest.

Malia Zaman IEEE Staff attended.

Approval of March 26, 2018 Minutes, motion by Thomas Yingling, seconded by Yann Elassad, No Changes.

Review of ballot comments on C57.32a

Motion by Federico to reject ballot comments asking for the reinstatement of deleted Lines 274-279. With the response that discussions about Coefficient of Resistance should be in the Application Guide, not this NGR Standard. The vote was 7 approve, 6 disapprove, 2 abstain. Chairman stated the motion failed because it did not achieve the required 2/3rds approval.

Subsequent discussion and clarification by IEEE staff confirmed that a majority was required, not 2/3rds. The 2/3rds approval required at the Pittsburgh meeting was necessary because it was a ballot change motion. Frederico's motion above is approved.

Motion by Yann to adjourn, seconded by Frederico. Motion passes.

Next meeting is the IEEE/PES 2018 Fall meeting in Jacksonville, FL October 16, 2018

Adjournment

Respectfully Submitted,
Tom Yingling - Secretary

Annex K Power Transformers Subcommittee

October 17, 2018
Jacksonville, FL
Meeting Time: 1:30 p.m.

Chair: Bill Griesacker
Vice Chair: Alwyn VanderWalt
Secretary: Daniel Blaydon

K.1 Meeting Attendance

The Power Transformers Subcommittee met on Wednesday, October 17, 2018 at 1:30 PM. The RFID attendance record indicated that 79 out of 112 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 203 individuals attended the meeting; 20 guests requested membership.

K.2 Approval of Agenda and Meeting Minutes

The Chair requested a motion for approval of the proposed meeting agenda. A motion to approve was made by Dan Sauer and seconded by Dave Geibel. The motion was approved by unanimous consent. The approved agenda can be found in Attachment K.2.

The Chair requested a motion for approval of the Spring 2018 meeting minutes. A motion to approve was made by Marnie Roussell and seconded by Dan Sauer. The motion was approved by unanimous consent.

K.3 Chair's Remarks

The chair provided an overview of the present subcommittee membership statistics, including new members and those members which had been moved to guest status.

The chair provided the dates and meeting locations for the next two Committee meetings.

The chair provided an overview of the Working Group and Task Force requirements for the scheduling of meetings, submission of minutes, and other administrative tasks.

K.4 Working Group and Task Force Reports

K.4.1 Revision of C57.12.10 IEEE Standard Requirements for Liquid-Immersed Power Transformers – Gary Hoffman

This group did not meet.

K.4.2 Revision of C57.93 IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Mike Lau

This working group met on Monday. There were 84 total attendees, 24 of 44 members present, establishing a quorum. The guide was balloted and received a 91% approval rating (112 returned ballots, 96 affirmative, 7 negative). There were 334 comments. A ballot resolution group was formed and the recirculation ballot was conducted in September. 4 of the voters changed their vote, which resulted in a 94% approval rating. 84 comments remain. They are currently in the process of conducting Recirculation #2. This ballot will close next Thursday.

The complete meeting minutes can be found in Attachment K.4.2.

K.4.3 Revision of C57.125 Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors – W. Binder

This group did not meet.

K.4.4 WG IEC 60214-2 - Tap Changer Application Guide and WG 60214-1-C57-131 - Tap Changers - Craig Colopy

The FDIS (final draft international standard) for the Part 2 Tap Changer Application Guide is completed and ready to be circulated for final review. It was agreed to do an additional recirculation ballot, so members of ballot can see changes made. Previous recirculation was 100% approval with all negatives resolved. Part 1 for Tap Changers and Part 2 will be joint revision standard.

The complete meeting minutes can be found in Attachment K.4.4.

K.4.5 C57.140 Guide for the Evaluation and Reconditioning of Liquid-Immersed Power Transformers – Paul Boman

This group did not meet.

K.4.6 C57.143 – Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Equipment – Mike Spurlock

This working group met on Monday. There were 122 total attendees, with 46 members present. A quorum was not established. Presentations were given on work done on Section 5 and Section 1 of the guide. It was noted that there will be a dedicated chapter just for communication of monitoring devices. There was no new business.

The complete meeting minutes can be found in Attachment K.4.6.

K.4.7 Revision of C57.148 Guide for Control Cabinets for Power Transformers - Joe Watson

This working group met on Monday. There were 33 total attendees, with 16 of 29 members present, establishing a quorum. Various sections of the document have been revised by Task Forces. Some more work will be required to clean up some sections of the existing standard. The WG plans to issue a straw ballot in a couple months and will have results by the Spring meeting. They intend to go to ballot pending the results.

The complete meeting minutes can be found in Attachment K.4.7.

K.4.8 Revision of C57.150 Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Larger – Greg Anderson

This working group met on Tuesday. There were 122 total attendees, with 24 of 37 members present, establishing a quorum. This guide was originally published in 2013. A revision is due by December 2022. Some of the topics discussed during the meeting for consideration in the next revision included impact recorders, shipping bracing, weather impacts, mobile substations and alternative fluids (natural esters).

The complete meeting minutes can be found in Attachment K.4.8.

K.4.9 Development of PC 57.153 Guide for Paralleling Transformers - Tom Jauch

This group did not meet.

K.4.10 Development of PC57.156 Guide for Transformer Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors - Peter Zhao

This group did not meet.

K.4.11 Development of PC57.157 Guide for Conducting Functional Life Tests for De-Energized Tap Changer Contacts - Phil Hopkinson

This group did not meet.

K.4.12 Task Force on V/Hz Curve – Joe Watson

This Task Force did not meet this week. Conference calls will be arranged before next meeting. If you would like to become part of Task Force, contact Joe Watson or Kipp Yule.

K.4.13 Task Force on Condition Assessment Guide – Brain Sparling

This working group met on Tuesday. There were 108 total attendees, with 98 members present, establishing a quorum. The task force spent time reviewing the scope and the CIGRE guide on condition assessment. A vote was passed recommending to the Sub-Committee that a new guide be established for condition assessment.

Brain Sparling moved to form a Working Group to develop a new transformer condition assessment guide. Sanjib Som seconded motion. Gary Hoffman spoke in opposition, stating that there is no scope or title. Dan Sauer seconded Gary's opinion that a Working Group cannot exist without a par. Dan Sauer moved to table the primary motion until the title, scope and purpose is to be defined. Kris Zibert seconded the motion. This motion passed by unanimous consent. This will be addressed as an old business item during the next subcommittee meeting.

The complete meeting minutes can be found in Attachment K.4.13.

K.5 Old Business

IEEE C57.135 Phase Shifting Transformers, joint IEC/IEEE Standard - It was noted that no work is being done on this standard at this time. It was recently approved and is not up for revision. The document will be reviewed during the next revision cycle.

K.6 New Business

Roger Fenton (consultant) made a motion to make an amendment to C57.12.10 to add provisions to radiators for the purpose of installing monitoring equipment. Roger explained that current monitoring provisions on drain valves are not sufficient for this purpose. This motion was seconded by Marcos Ferrera.

The following discussion took place on the floor:

-Brian Sparling stated that this would belong in the C57.143 monitoring guide, not in base standard C57.12.10

-Dan Sauer stated that deciding whether to include fittings as a standard requirement would determine whether it should be included in a guide or standard.

-Gary Hoffman stated that C57.12.10 covers minimum requirements, not maximum requirements and reiterated that the group needs to decide whether this should be a requirement for all transformers.

-Joe Watson stated that monitoring provisions are not currently included in C57.12.10 in any form.

-Bill Griesacker stated that the proposed change is something new that is not broadly adopted in the industry and the request would make this new device a standard requirement for all transformers.

-Gary Hoffman called the question which seconded by Dan Sauer.

-There were 41 in favor, 2 opposed, and 4 abstentions. This effectively ended further discussion on the original motion.

-A vote on the motion to amend 12.10 was called.

-There were 4 in favor, 41 opposed, 3 abstentions, and therefore the motion did not pass.

There was no further new business.

K.7 Adjournment

The meeting was adjourned at 2:24 pm

K.8 Attachments

Attachment K.2 – S18 PTSC Agenda
Attachment K.4.2 – PC57.93 Installation Guide
Attachment K.4.4 – WG IEC 60214-2 - Tap Changer Application Guide and WG 60214-1-C57-131 - Tap Changers
Attachment K.4.6 – C57.143 Monitoring Guide
Attachment K.4.7 – PC57.148 Control Cabinets
Attachment K.4.8 – C57.150 Transportation Guide
Attachment K.4.13 – Task Force on Condition Assessment Guide

Attachment K.2

AGENDA

Power Transformers Subcommittee IEEE PES
Transformers Committee Wednesday,
October 17, 2018, 1:30-2:45 PM
Hyatt Regency Jacksonville Riverfront Hotel; Jacksonville, Florida, USA
Bill Griesacker – Chair, Alwyn VanderWalt – Vice Chair, Dan Blaydon – Secretary

1. Call to order
2. Determine quorum
3. Approval of previous meeting minutes
4. Chair remarks
5. Working Group and Task Force reports
    a. WG Revision to C57.93, Installation Guide ..... M. Lau
    b. WG 60214-1-57-131, Tap Changers (on hold) ..... C. Colopy
    c. WG Tap Changer Application Guide IEC 60214-2 ..... C. Colopy
    d. WG Revision of C57.143, Monitoring Guide ..... M. Spurlock
    e. WG Revision of C57.148, Control Cabinet Standard ..... J. Watson
    f. WG Revision of C57.150, Transportation Guide ..... G. Anderson
    g. TF Transformer V/Hz Curves ..... J. Watson
    h. TF Transformer Condition Assessment Guide ..... B. Sparling
6. Old business
    a. IEEE C57.135 Phase Shifting Transformers, joint IEC/IEEE Standard - document revision will start in IEC. Task force to be formed to determine the scope for revising the standard.
7. New business
8. Adjournment

Attachment K.4.2

Working Group for Installation of Power Transformers C57.93
1:45 pm – 3:00pm
Hyatt Riverfront Grand Ballroom 1, Jacksonville, FL.
Monday, October 15th, 2018

Chairman Mike Lau
Vice Chairman Alwyn VanderWalt
Secretary Scott Reed

The meeting was called to order at 1:46 pm by Chair Mike Lau.

There were 26 of 44 members present. There were 40 guests and 15 visitors. A membership quorum was achieved.

Agenda

1. Attendance Roster Sign In / Quorum Check
2. Patent Call
3. Approval of the Agenda
4. Approval of the Spring 2018 minutes
5. March/April Ballot
6. September Recirculation #1 Ballot
7. Recirculation #2 Ballot
8. Unfinished Business
9. New Business
10. Adjournment

The Spring 2018 Minutes were unanimously approved. The Fall 2018 Agenda was unanimously approved.

Chairman Lau posted the Patent Claim. No notifications or comments were received.

Chair's Remarks:
Chairman Lau remarked that the PAR had been extended for one year. Next, he announced there were 132 eligible voters for the March 2018 ballot: 96 voted to affirm the guide, 9 negative votes were submitted with comments, and 7 voters that abstained. The guide met the minimum threshold of 75% approval rate. There were 339 comments submitted, mostly editorial (should/shall), so the Ballot Resolution Group divided the comments for review. The Ballot Resolution Group consisted of:

Deanna Woods	Joe Watson
Wally Binder	Kevin Sullivan
Pat Rock	Alan Sbravati
Stephanie Denzer	Don Dorris
Mike Lau	Alwyn VanderWalt
Scott Reed	

A revised draft 1.6 was sent out for recirculation on September 11, 2018. Three previous negative votes affirmed the revised guide for a total of a 94% approval. The second ballot revision had 84 comments

and again, mostly editorial (should/shall, immersed/filled). The revised guide has been updated and is in the process of going through a 2nd Recirculation ballot . IEEE was consulted, some of the comments were accepted, some revised and some rejected—i.e., the title of the guide is “Immersed” so “immersed” should be the primary term used. The ballot will be closed by the October 25, 2018.

No new business was discussed.

The meeting was adjourned at 1:58 pm. If the 2nd Recirculation ballot is successful, this will be the last meeting of this working group.

Scott Reed, Secretary

Attachment K.4.4

Meeting Minutes	Page 8 of 20	REV 0
P60214-2	Working Group #	
Tap-Changers - Part 2: Application guide	Working Group Title	

Chair: Craig A. Colopy **Vice-Chair** Axel Kraemer

Secretary Adam M. Sewell

Current Draft Being Worked On: FDIS

PAR Expiration Date: December 31, 2018

Meeting Date: 16 October 2018 **Time:** 8:00am to 9:15am

Location: Jacksonville, FL

K.9 Attendance: **K.10 Members**	**16/28**
K.11 Guests	**54**
K.12 Guests Requesting Membership	**12**
Total *(recorded in AMS)*	**70**

Meeting Minutes / Significant Issues / Comments:

1. Meeting was called to order at 8:00 am, October 16, 2018.
2. Introductions were made and attendance sheets were passed out.
3. More than 50% WG members were in attendance so a quorum was established
4. Call for patents were made with no response from any attendees.
5. Agenda for this meeting was unanimously approved.
    a. Motion-Dave Geibel, Dieter Dohnal-second
6. IEEE Minutes from March 2018 in Pittsburgh were unanimously approved.
    a. Motion-Dave Geibel, Dieter Dohnal-second
7. Chair and Vice Chair comments
    a. IEC FDIS is ready and scheduled to be distributed and scheduled by end of Oct 2018
        i. FDIS technical comments aren't allowed, only editorial
    b. IEEE recirculation ballot will go out after IEC FDIS – scheduled by start of Nov 2018
    c. IEC CDV comments were reviewed by Vice Chair
        i. CDV comments were addressed and now FDIS is ready for distribution

ii. Comments file will be posted on 60214-2 website

d. 60214-1/C57.131 update

i. IEEE will do joint revision with IEC 60214-1 when stability date is up in 2020/2021

ii. IEEE C57.131 will not be revised and left to expire

8. Next meeting – no planned meetings.

9. Meeting adjourned at 8:45am.

a. Motion- Marc Foata, second-Dieter Dohnal

Submitted by: Craig A, Colopy Date:

Attachment K.4.6

Revision to C57.143 – "Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Components"
Transformer Monitoring Working Group

Monday, October 15, 2018
Jacksonville, FL, USA
Minutes of WG Meeting

The meeting was called to order at 3:15 pm by Chair Mike Spurlock. Vice Chair Brian Sparling and Secretary Elizabeth Bray was also present.
This was the fourth meeting of the working group, rosters were circulated and members asked to stand to determine quorum, quorum was not reached with 46 of 103 members present. The attendance for the meeting was as follows:

Number of Members in Activity = 103
Number of Members Present = 46
Quorum Present = 44.7%
Number of attendees = 122
Attendees requesting Membership = 9 (To be reviewed based on Participation to date)

The WG does plan to meet at the Spring 2019 Transformers Committee Meeting in Anaheim, CA.

PAR Status: PAR for a Revision to an existing IEEE Standard
Type of Project: Revision to IEEE Standard C57.143-2012
PAR Request Date: 19-Nov-2016
PAR Approval Date: 17-Feb-2017
PAR Expiration Date: 31-Dec-2021

The Agenda for the meeting was reviewed as seen below.

A. MEETING AGENDA

1. Welcome & Introduction
2. Call for Patent Disclosure
3. Roster Circulation
4. *Quorum Roll Call*
5. Chair Remarks
6. Recognition of past and introduction of new Secretary for C57.143 WG.
7. Recognition and thanks to volunteers.
8. New Members – Indicate on Roster
9. Call for approval of Spring 2018 Meeting Minutes (Pittsburgh, PA)
10. Working Group Activities
    a. Poorvi, Emilio, and Bill update on their team's progress.

a.i. Chapter 5 “Monitored Parameters”.
a.ii. Chapter 6 “Monitoring Systems and Equipment”.
a.iii. Discuss possible new Chapter on Communications and Connectivity.
a.iv. Discuss possibility to include Annex “E” (informative) “Communications Protocols for On-line Monitoring Equipment” into the new Chapter.

b. Brian Sparling to discuss progress to date and plan going forward for Chapter 1 “Overview”.

11. New Business

Mike Spurlock mentioned a letter of assurance (LOA) was received previously on a patent claim and asked for any additional patent claims against C57.143 to be raised by attendees. One additional patent claim was received during the meeting, which was not related to the first claim.

Mike Spurlock reviewed the Par Status and Scope and Purpose for the PAR with the working group.

Mike Spurlock shared a recent AEP transformer failure with a news clip.

Bill Whitehead presented on the update on the work being down around Chapter 5. Each topic will include the general purpose of the technology including detecting time, operating conditions, technology types with installation and maintenance description. It was recommended that Chapter 5.1 (thermal properties) and 5.3 (load) be combined. Due to the lack of quorum this topic was brought up for discussion only. Volunteers have been emailed for potential meetings the week of November 5th 2018. .

Brian Sparling gave the background on the existing Chapter 7 material. The source of the chapter came from IEEE C37.10.1 Application to monitoring circuit breakers. Also noted that Cigre looked at the economics in a different method with technical risk into financial terms. The Cigre guides are TB 248, Guide on Economics of Transformer Management June 2004. Also mentioned during the meeting was the possible recommendation for fitting the means for future addition of monitoring on new transformers. The Cigre Guide for Recommendations for Condition Monitoring and Facilities for Transformers is TB 343 April 2008, provides a recommendation for this need. Both Guides are available (in soft copy) from the Cigre web site at no cost. The source of this was independent of vendors.

The new Chapter 6 will be the old Annex E on the topic of Communications. Brian Sparling agreed to lead this work. Brian also suggested investigating outside this working group for assistance. The previous Annex E was compiled with the assistance of the IEEE Substation Committee.

No new business could be conducted so the committee opened the floor to comments and suggestions. What about updating Chapter 7. Luiz Cheim asked the question who is going to use this data? Gary Hoffman brought up the point that justification for monitoring maybe should be looked at. Gary would volunteer for this task. Gary also plugged the new working group for distribution transformer monitoring and justification for monitoring distribution transformers was on their agenda for tomorrow.

A motion to Adjourn was given by Marcos Ferreira and seconded by Joe Watson, Meeting adjourned at 4:00pm.

Attachment K.4.7

Revision of C57.148 Standard for Control Cabinets for Power Transformers
Joe Watson: Chair, Weijun Li: Vice-Chair, JF Collin: Secretary

The working group met at 11:00 AM on Monday 10/15/2018 in Grand Ballroom 1 at the Hyatt Regency Jacksonville Riverfront in Jacksonville, Florida. 33 attendees were recorded, including 16 of the 29 members (55.2%). Quorum was reached. It was the fifth official Working Group meeting for this project. The complete attendance record is available in the AMS System. 1 guest requested membership.

As required by the main committee, the Patent question was asked at the beginning of the meeting. No essential patents were claimed. The Pittsburgh Spring 2018 meeting minutes and the Jacksonville Fall 2018 meeting agenda were approved unanimously.

The WG chairman said the newest revision of the standard was sent out for WG's review prior to this meeting. Markus Stank asked why the comment resolution spreadsheet was not included with the latest draft. It was clarified that only a clean copy of the latest Draft and another copy with all changes shown were sent to the WG before the meeting. The Task Forces' straw ballot comment resolution list was not sent to the WG. All pertinent comments were discussed in the previous two meetings and resolved by the task forces. Editorial changes by the WG officers have also been incorporated into the latest revision.

Gary Hoffman asked if any additional straw ballots are planned. The WG chairman confirmed that one straw ballot was conducted within the working group and we may have another one following the next revision of the document. The WG chair also estimated that the working group should be able to complete the document and go to ballot after 2 more meetings. The PAR expires at the end of 2020.

Section 5.17 Lights and AC Power Outlet was then discussed. Markus Stank asked why LED was removed from the text. After an extensive discussion, the WG agreed that the cabinet could be illuminated with any current or future types of light approved by the User, but that the light fixture should be designed to accept the most common currently available type when replacement is needed and agreed to avoid discussion on different types of lights and just update the section to read the following: "…The light fixture shall include a standard 26mm, E26 base."

Regarding Figures A.4, A.5 and A.6 of Annex A, Ryan Musgrove proposed to replace Schematic with Scheme to reconcile the updated definition and requirements for Schematics. This was agreed and the applicable changes will be included in the next revision.

Gary Hoffman inquired about his previous comment regarding the optional contactor monitoring capability. It was confirmed that this particular comment has already been addressed in 5.20.1 of the updated document.

Another point of discussion at the meeting was regarding the Sample Ordering Form in Annex B. WG Chairman asked if any users, OEMs or control cabinet suppliers have ever used this ordering form. JF Collin responded that he has never seen this request and said OEMs usually have their own ordering form based on their own standard or special request from the end user. Ryan Musgrove said that the WG needs to review Annex A and Annex B and ensure that all recent changes will be reflected. Wallace Binder proposed to replace the title of “Sample ordering form” with “Sample check list” and this was agreed by the WG.

The WG Chairman said that the document will be updated accordingly and will be made available for the WG’s review 2 or 3 months before the next meeting. Another straw ballot will be done.

A motion to adjourn was proposed by Kris Ziebert and seconded by Patrick Rock. The meeting was adjourned at 12:00 PM. The group will meet again in Anaheim, California in March 2019.

Attachment K.4.8

C57.150 – IEEE Guide for the Transportation of Transformers and Reactors Rated 10 000 kVA or Higher
Tuesday, October 16, 2018; 11:00 a.m. – 12:15 p.m.
Hyatt Regency Jacksonville Riverfront Grand Ballroom 5
Jacksonville, Florida, USA
Minutes of WG Meeting

The meeting was called to order at 11:03 a.m. by Chair Greg Anderson. Vice Chair Ewald Schweiger and Secretary Marnie Roussell (writer of Minutes) were also present.

There was a total of 122 people present. This included 24 members present of the 37 members in the working group, resulting in a 64.9% quorum. Attendance was taken utilizing RFID tabulation. Paper rosters were not passed around, so any guests desiring membership were asked to contact one of the WG leaders.

Agenda

1. Welcome and Introductions
2. Patent Issues
3. Determination of Quorum (determined by RFID system)
4. Approval of the Minutes
5. Old Business
    a. Timeline of Project
    b. Review of assigned work
6. New Business
7. Additional discussion, ideas
8. Adjourn

Introductions of the Chair, Vice Chair, and Secretary were made. Attendees were asked to introduce themselves and indicate their affiliations when making comments or asking questions (although this was later determined to be an unnecessary task).

A call for essential patent claims was made. No patent claims were identified.

There were no objections to the agenda as identified above.

Minutes of the Spring 2018 Meeting were posted within the minutes of the SC Power Transformers. The minutes were approved with a motion by Eduardo Garcia and seconded by Susan McNelly.

List of Meeting Attendees is provided below. Those identified with an asterisk are WG Members in attendance. Those granted membership at this meeting are noted with two asterisks (**)

Hamid Abdelkamel*
Mario Alonso**
Gregory Anderson*
Javier Arteaga*
Roy Ayers
Jay Bennett
Mats Bernesjo
Enrique Betancourt
Wallace Binder*
William Boettger*
Sanket Bolar
Paul Boman
John Brafa
David Calitz
Stephen Cameron
Juan Castellanos
Jorge Cruz Cienfuegos
Paul Dolloff**
Don Dorris
Joshua Elliott
James Fairris*
Howard Fennell
Eduardo Garcia*
James Gardner
Jorge Gonzalez de la Vega
Jeffrey Gragert
James Graham
Bill Griesacker
Shamaun Hakim
Robert Harper
Thomas Hartmann
Joseph Holleran
Jill Holmes
Anirudhdhsinh Jhala
Grace Jones
Stephen Jordan**
Akash Joshi
Kurt Kaineder
Gael Kennedy
Zan Kiparizoski
Lawrence Kirchner
Peter Kleine**
John Lackey
Michael Lau*
Antoine Lecomte
So-young Lee*
DongGi Lim
A. Pedro Lima
Jacky Lin
Parry Lively
Kerry Livingston
Mario Locarno*
Mark Lowther, Jr.
Andrew Lugge
Tara-lee MacArthur
Richard Marek
Rogelio Martinez
Douglas McCullough
John McFadden
Susan McNelly*
Vinay Mehrotra
Michael Miller
Paul Morakinyo
Martin Munoz Molina
David Murray
Ryan Musgrove
Paul Mushill
Shankar Nambi**
Anthony Natale
William Oliver
Anastasia O'Malley
Jamie Partington
George Partyka
Brian Penny
Ion Radu
Rakesh Rathi*
Jeffrey Ray
John Reagan
Kevin Riordan
Marnie Roussell*
Jose Salva
Oliverio Sanchez
Amitabh Sarkar
Mark Scarborough
Eric Schleismann
Alfons Schrammel*
Ewald Schweiger*
Pugazhenthi Selvaraj
Cihangir Sen**
Samuel Sharpless*
David Sheehan
Mark Shem-Tov*
Jin Woo Shin
Yukiyasu Shirasaka
Richard Simonelli
Andre Simons*
Kenneth Skinger*
Christopher Slattery
Arthur Speegle
Mike Spurlock
Brad Staley
Andrew Steineman
Gregory Stem
Kevin Sullivan*
Charles Sweetser
Craig Swinderman*
Radoslaw Szewczyk
Troy Tanaka
Robert Thompson
Krishnamurthy Vijayan**
Dharam Vir
Waqar Wahid
Hugh Waldrop
David Wallach*
Bruce Webb**
Matthew Webb
Kenyon Webber
Peter Wei
Matthew Weisensee*
Daniel Weyer
Jeffrey Wright
Kris Zibert*

Timeline

Greg provided a brief history of the document and the timeline for the revision. He indicated we need to essentially have a complete draft done at least a year prior to the 12/31/2022 expiration of the PAR.

Revision Topics/Assignments

The Task & Assignments were reviewed and status provided.

Assignments Chart			
Task	**Brief Scope (see meeting minutes)**	**Assigned To (team assigned to each task)**	**Status**
CIGRE Guide	Compare CIGRE document 673 - WG A2.42-2016 to our Guide. Identify topics to be included.	H. Abdelkamel, M. Locarno, K. Vijayan, S. Nambi, E. Schweiger, B. Webb	Done
	#3 Definitions	Paul Dolloff, Mario Alonso	WIP
	#4 Transport Incidents - case studies	Paul Dolloff, Mario Alonso Need more volunteers	WIP
	#5 Design Considerations for Transportation	Need more volunteers	WIP
	#7 Design review	K. Vijayan, Mario Alonso, A. Jhala	WIP
	#8, 12, 13 Transport (process, planning, instructions)	Need more volunteers Shankar Nambi	WIP
	#9 10 Impact recorder application and data interpretation	Paul Dolloff Need more volunteers	WIP
	Annex Flowchart for test/conditions after transport	Need more volunteers	WIP
Swimlanes	Helpful "matrix/table" to Guide	D. Wallach	Done
Impact Recorders	Enhance section on impact recorders	S. Nambi, K. Nunn, R. Rathi, J. Watson, P. Dolloff	
Internal Bracing	Add guidance (careful, a design issue!)	R. Verdolin, J. Watson, M. Alonso	
External Bracing, Lashing, etc.	Provide some guidance	Kris Zibert Need more volunteers	
Exceeding Impact Limits	Add: What to do if specified impact limits are exceeded.	R. Verdolin, J. Watson	
Tests	Compare Tests, C57.150 vs. C57.152	W. Binder, J. Watson	
Air Pressure	Add: How internal air pressure changes w/ambient temperature.	J. Arteaga, Peter Kleine	WIP
SFRA	Enhance section on SFRA	G. Anderson, R. Su, K. Sullivan	
C57.93, Installation Guide	Review C57.93 for any overlap and conflicts.	J. Sen, Mike Lau	Done
Shipping w/Natural Ester Fluids	Add section of unique issues	R. Simonelli, A. Jhala	
Mobile Subs	Add section of unique issues	K. Vijayan Need more volunteers	
Design Review Checklist	Checklist of discussion topics during a design review	K. Vijayan, Mario Alonso, A. Jhala	

CIGRE Guide

Ewald Schweiger summarized an initial review of the CIGRE Guide on Transformer Transportation, WG A2 42 (CIGRE Proceedings 673). Bruce Webb, Ewald Schweiger, Mario Locarno, and Shankar Nambi met October 11, 2018 to finalize the recommendations from 673 to be included in C57.150. Shankar presented the recommendations to the working group. Volunteers were requested to assist in incorporating the details in C57.150. The presentation and Comparison Matrix details will be posted to the website.

Swim Lanes

Dave Wallach completed the Swim Lanes Concept matrix. It is posted to the website.

Impact Recorders

Paul Dolloff volunteered to assist the existing team with this effort.

Field Tests

Wallace Binder indicated that the working group C57.152 will starts in about 2020. The working group for C57.150 will make a recommendation to add a column indicating when to perform the tests.

Air Pressure

Peter Kleine volunteered to assist Javier Arteaga with this effort.

C57.93 Installation Guide

Mike Lau will be assisting Jon Sen to prevent C57.150 from repeating material already stated in in C57.93 Installation Guide. C57.93 refers to C57.150 and indicates a clear demarcation between the two guides as the point at which the transformer is placed on the foundation. Jon Sen noted that C57.93 is more detailed than C57.150 and suggested adding additional detail to match C57.93 without repeating the material.

Shipping w/Natural Ester Fluids

Richard Simonelli and Anirudhdhsinh Jhala volunteered to develop this topic.

Mobile Sub

Krishnamurthy Vijayan volunteered to develop this section, but additional volunteers are desired.

Design Review Checklist

Dave Wallach suggested that the working group add a Design Review Checklist to the guide. Krishnamurthy Vijayan, Mario Alonso, and Anirudhdhsinh Jhala volunteered to develop this checklist.

New Business – There was no new business

The meeting was adjourned at 11:54 p.m. with a motion by Wallace Binder that was seconded by Samuel Sharpless.

The Working Group plans to meet at the Spring 2019 Transformers Committee Meeting held March 24-28 in Anaheim, alifornia USA.

Greg Anderson
WG Chair

Ewald Schweiger
WG Vice Chair

Marnie Roussell
WG Secretary & Technical Editor

Location: Jacksonville, FL

Meeting Room: Grand Ballroom 5, Hyatt Hotel

Date: Tuesday, Oct 16, 2018

Time: 9:30 AM – 10:45 AM hours

Meeting Minutes
Task Force on Condition Assessment

- Introductions
- The Chair and Vice-Chair could not attend the Pittsburgh meeting and Joe Watson stepped in to chair the meeting.
- The Task Force met at 9:30 AM on Oct 16, 2018 in the Grand Ballroom 5 of the Hyatt Hotel with 108 attendees (going by roster) in total with 51 (hand count) of the 98 TF members present. A quorum was present.
- Call for patents – there were no issues.
- The Jacksonville meeting agenda was approved and adopted.
- The previous minutes from Louisville and Pittsburgh were approved- proposed by Luiz and seconded by Joe Watson.
- Brian Sparling: Brian asked the TF if we need to develop a new condition assessment guide or revise the existing C57.140 guide. He identified a number of gaps between the almost approved CIGRE A2.49 guide and the C57.140 guide. Brian stated that CIGRE is okay with the idea of using their document provided IEEE makes the necessary acknowledgement while revising the C57.140 guide.
- Joe Watson felt that we should open up the C57.140 guide and revise it. Paul Bowman also supported this idea.
- Tom Prevost supported the idea of opening up C57.140 and revise the necessary sections to fill the gaps but not necessarily copy the A2.49.
- Patrick Picher started a discussion on Chapter 7 of C57.140. Joe Watson mentioned C57.140 has considered the individual failure probabilities of all components to obtain an overall cumulative probability which in turn provides input to the overall transformer failure probability. Luiz Cheim suggested we should focus on RCM evaluation method in the revision of C57.140 and not base it on simple health indices as used by many utilities now. Brian added that A2.49 guide has a good condition assessment method and severity of condition section.
- Tom Prevost reminded the TF that C57.140 contained many sections covering repairs, life extension, component upgrading and that if C57.140 is to be revised then its scope will have to be changed.
- Ali Naderian felt that CIGRE is a solid guide for condition assessment, but we have to be careful about how we go about using it.
- Roger Fenton felt that A2.49 is too complex and we should look at oil condition and gas energy levels to simplify the methods of arriving at condition assessment indices.
- Jeffrey Wright stated that condition assessment is not in the scope of C57.140 and will need to be added if it is revised.
- Poorvi Patel mentioned that C57.140 is more focused on reconditioning transformers.
- Joe Watson felt we should lay guidelines for condition assessment in C57.140 and gave the example of how DGA was introduced in 1980 but analytical tools were not available until much later.

- Bill Whitehead and Emilio proposed a motion to close this TF and open up C57.140 to add knowledge. Joe Watson felt we could add the chapters to C57.140 to fill the gaps with A2.49. Jim Graham suggested we move that the TF has completed its work and let the SC make this recommendation.
- Tom Prevost made the motion that the TF recommend to the SC that a new WG be started to develop a new condition assessment guide. Luiz seconded it. Sue asked if we to consider if C57.140 should also be revised. The motion passed with 44 votes in favor and 7 opposed to it.
- Jim Graham thought that we could make more than one recommendation to the SC
- David Wallach (seconded by Craig S) moved a second motion to open C517.140, perform gap analysis and make recommendations to the SC. Joe Watson and Tom Prevost objected to this motion.
- Bill Griesacker, the SC chair, felt that we need to make only one recommendation from the TF. After some discussion, David W withdrew his motion (seconded again by Craig S).
- Conclusion reached is to make the recommendation to the Power Transformers SC, to begin the process of developing a new Guide for the Condition Assessment of Power Transformers.
- The TF, having completed its task has now disbanded
- The TF meeting was adjoined after this discussion.

SUBSEQUENT TO THE TF meeting, additional information became available at the Power Transformers SC meeting,

1) During the discussion in the Power Transformers SC, the Chairman was informed by Gary Hoffman, that our task has not been completed.
2) Though we did discuss a scope and title in previous meetings, the TF must come up with a revised Title and Scope and a Purpose that focusses on condition assessment, and recommend a new PAR to the PTSC, to move forward.
3) Therefore, there will be a meeting of the TF for Condition Assessment at the Spring meeting in Anaheim. The objective of the meeting will be the development and approval of the items detailed above.
4) Between now and the spring meeting, Kumar Mani and I will be arranging some WEB or conference call meetings for the TF members to have some preliminary discussions on the above noted points

Brian Sparling Chair

Kumar Mani Secretary

Annex L Standards Subcommittee – Unapproved Minutes

October 17, 2018
Jacksonville, FL
USA

Chair: Jerry Murphy
Vice Chair: Daniel Sauer
Secretary: Marcos Ferreira
Standards Coordinator: Jim Graham

The Chair, Jerry Murphy opened the meeting calling for a show of members to establish quorum which was met.

L.1 Meeting Attendance

The Standards Subcommittee met on Wednesday, October 17, 2018 at 4:30 PM EDT. A show of hands indicated 28 of 48 members in attendance the beginning of the meeting which met the quorum requirement. Overall the attendance roll showed there were 84 attendees, 28 members, 51 guests, including 5 that requested membership upon tabulation of the circulated rosters and will be reviewed for eligibility. Furthermore, RFID system and paper rosters were available. Jim Graham moved to approve the agenda with second by Steve Shull; motion was carried with unanimous consent. Jerry then requested a review of the Pittsburg minutes; motion was made by Jim Graham and seconded by Steve Shull; motion was carried with unanimous consent.

L.2 Chair's Remarks

L.3 Working Group and Task Force Reports

L.3.1 Continuous Revision of C57.12.00-2015 – Steve Snyder

The purpose of this WG is to compile all the work being done in various TF/WG/SC's for inclusion in the continuous revision of C57.12.00 in a consistent manner. This WG coordinates efforts with the companion Standard C57.12.90 so that they publish together.

The current standard was approved by the IEEE-SA Standards Board on December 5, 2015, with an official publication date of May 12, 2016. The standard is good for 10 years but is under continuous revision and will be next balloted when sufficient new material is available. The PAR which covers the ongoing continuous work on the document is good through December 31, 2021.

As agreed at the Fall 2016 Standards Subcommittee meeting, any new material provide to me for inclusion in the next revision, will first be presented to this subcommittee for the "official" vote of approval. At this time no new **approved** material has been submitted to me since the Spring 2018 meeting.

I am aware of new material that is nearly ready for inclusion: An update to the Minimum External Clearances of Transformer Live Parts, Table 10 (Dielectric Tests), and the inclusion of a new reference tables for sound pressure level (Performance Characteristics). Based upon this and other work in process, I anticipate the next revision ballot to begin in 2020, with all the updates collected at the close of 2019. I will reach out to all SC chairs after this meeting to request they update me with whatever material they have already approved.

L.3.2 Continuous Revision of C57.12.90-2015 & Cor. corrections – Steve Antosz

INTRODUCTION

This is a working group by committee of task forces, for continuous revision of C57.12.90. The purpose of the WG is to keep track of the work being done in various TF/WG/SC's for inclusion in the continuous revision of C57.12.90 in a consistent manner.

SUMMARY

The revised document was published in March 2016 as IEEE Std C57.12.90-2015. Shortly after the document was published, one error and one omission were discovered, so a Corrigendum was done and published on March 23, 2017.

STATUS

A new PAR was approved by NESCOM in December 2017.

FUTURE REVISIONS AND PENDING WORK

As agreed at the Fall 2016 Standards Subcommittee meeting, any new material provided by the various Task Forces to this WG Chair for inclusion in the next revision, will first be approved by the responsible technical subcommittee (Diel Test, PCS, Dist, IL, etc) and then presented to the Standards Subcommittee for the "official" vote of approval.

Since this is a continuous revision document, there continues to be ongoing work in the various Task Forces.

Changes *already approved* for the next revision:

- Changes to 9.3.1 Wattmeter-voltmeter-ammeter method from Mark Perkins' PCS TF for Revision of C57.12.90. Final survey approved in Nov 2015 in both the TF and PCS. The following text is to be added just prior to Figure 18 for three-phase transformers:

  An alternate method for either single phase or three phase transformers is to provide capacitive compensation for the transformer impedance at the terminals of the transformer so that the AC source need only supply the real power for the test. Figure 18 shows the apparatus and connections for a single-phase transformer for this alternate method and the method can also be used in a three-phase configuration. In this case, the wattmeter will measure the real power of the transformer under test plus the power of the capacitors, which will be very small compared to the power in the transformer. The load loss in the transformer is determined by subtracting the loss in the capacitors from the measured loss. For modern oil film capacitors, a loss of 0.2 watts per actual kVAR may be used unless a specific capacitor bank loss is known. This method requires a separate CT or set of CTs at the transformer for setting the current and measuring the transformer impedance. The advantage of this alternate method is that the phase angle between the voltage and current at the wattmeter is low (closer to zero degrees) due to the capacitor compensation, so any phase angle errors in the loss measurement circuit are much less significant.

- Add in subclause 10.3.1 and 10.3.1.1 Lightning Impulse, the following words in red; by Pierre Riffon's WG Revision to Impulse Test in Dielectric Test Subcommittee. Submitted on 11/4/2016. These subjects have been surveyed within the Dielectric Tests SC and within the TF. The 4th survey got a 100% approval rate.

  10.3.1 Impulse tests shall be made without excitation. The impulse waveshape parameters such as peak voltage, front time and tail time are determined on the test voltage curve which is obtained after having processed the recorded curve using the test voltage function method, as defined in IEEE Std. 4.

10.3.1.1 Full-wave test

The test wave rises to crest in 1.2 µs and decays to half of crest value in 50 µs from the virtual time zero. The crest value shall be in accordance with the assigned basic impulse insulation level (BIL), subject to a tolerance of ± 3%; and no flashover of the bushing or test gap shall occur. The tolerance on virtual front time should be ± 30%, and the tolerance on time to half of crest should be ± 20%. However, as a practical matter, once the manufacturer has proven that they have test equipment limitations, the following shall be considered:

a) If the standard impulse shape cannot reasonably be obtained because of low winding inductance or high capacitance to earth and the resulting impulse shape is oscillatory so that the relative overshoot magnitude exceeds 5 % then the front time may be increased to reduce the overshoot amplitude. In all cases, the front time shall not exceed 2.5 µs regardless of the overshoot amplitude.

Note 1: The overshoot can be reduced by increasing the front resistor value of the impulse generator. The use of low inductance connections between the impulse generator and the tested transformer are also recommended.

- New wording in subclause 10.3.1.3 Chopped-wave test, approved following the Louisville meeting in Fall 2017.

10.3.1.3 Chopped-wave test

A chopped wave is inherently a full lightning impulse wave, except that the crest value shall be at the required level and the voltage wave shall be chopped at or after the required time to flashover (time to chopping) but not later than 6 µs after virtual origin. The virtual front time of the chopped wave may be different than the virtual front during a full-wave test because of the presence of the chopping gap. Nevertheless, the tolerance on the virtual front time for the chopped-wave test should remain as defined for full-wave test.

The gap or other equivalent chopping device shall be located as close as possible to the terminals of the transformer without disrupting its electrical field distribution. The distance between the chopping device and the test object shall not exceed a lead length greater than the total height of the transformer (tank + bushing). The impedance between the tested terminal and the grounded end of the chopping device shall be limited to that of the necessary leads. The voltage zero following the instant of chopping should occur within 1 µs. However, for some winding and transformer designs (particularly low-voltage windings of high stray capacitance, layer windings, high capacitance windings, UHV transformers requiring large clearances, etc.), the circuit response after chopping may not be oscillatory it may be overdamped or may collapse to zero with a lower frequency (slower voltage collapse). For such cases, the time interval to the first voltage zero after the instant of chopping may be significantly greater than 1 µs and this deviation shall be accepted if the chopping gap is located as described above.

In order to have a common procedure for the determination of the steepness of voltage collapse, the steepness of the voltage collapse shall be the time interval between the instant of the voltage chopping to the instant where the applied voltage is 20% of the voltage level at instant of chopping. This time interval should be equal to or less than 0.8 µs.

Only for cases…(*this paragraph and the last paragraph remain as they are in the 2015 edition, including the three NOTES*)…"

- Add the following text in red to subclause 10.8.2 Test Procedure (for Induced Test). This work was done in Bill Griesacker's (formerly Bertrand Poulin) Task Force. The work started in 2015 and after several surveys was approved in October 2018. It stipulates a limit of overpressure applied inside a transformer tank during induced voltage test.

10.8.2 Test procedure

The voltage shall first be raised to the 1 h level and held for a minimum of 1 min or until a stable partial discharge level is obtained to verify that there are no partial discharge problems. The level of partial discharges shall be recorded just before raising the voltage to the enhancement level. The voltage shall then be raised to the enhancement level and held for 7200 cycles. The voltage shall then be reduced directly to the 1 h level and held for 1 h.

During this 1 h period, partial discharge measurements shall be made at 5 min intervals. Partial discharge acceptance criteria shall be based on each line terminal rated 69 kV and above. These measurements shall be made in accordance with 10.9.

The pressure inside the transformer tank during induced test shall not be increased by artificial means for the purpose of reducing the PD level. The liquid level and pressure inside of the transformer tank and/or conservator tank shall be configured such that oil head pressure during the induced test does not exceed the pressure under usual service conditions. Any exceptions that increase tank pressure by more than 3.5 kPa (0.5 psi) over normal operating pressure, such as the use of an elevated test facility conservator tank, requires customer approval prior to test. A note shall be added to the certified test report confirming this approval.

Note: Increasing the pressure for diagnostic purposes, such as to identify and possibly reduce suspected bubbles in the liquid, may be done as a remedial step to diagnose a source of high PD. To be considered valid, the test shall be repeated with no added pressure as stated above.

pending work

- Possible future addition of a new clause for a Load Tap Changer Performance Test, from Hakan Sahid PCS TF for Revision of C57.12.90.

  This TF also is considering:

  a) to add a new clause 4.5 in General Section that a transformer be tested with the same insulation liquid that it will use in service. For example, a unit to be filled with ester liquid should (or shall?) not be tested with mineral oil in the factory. Or this requirement may be put into C57.12.00 Clause 8.1 General Testing.

  b) Load Tap Changer performance 8.7 voltage test and 9.6 current test. Text seems to have been approved in Fall 2018, and moved up to the Perf Char SC.

  c) Addition in 5.4.1 new wording for winding resistance test requirement on wye connected transformers with neutral bushing brought out

  d) Number of short circuit tests under clause 12.3.4

  e) Altitude correction under clause 11.4.2

  f) OLTC continuity tests

- Other possible revisions to subclauses 10.2 to 10.4 from Pierre Riffon's TF for revision of impulse tests. Ongoing work continues.
  - Revision to 10.3.2.1 Connection of tertiary bushings during impulse test

10.3.2.1 Terminals not being tested

Neutral terminals shall be solidly grounded. Line terminals, including those of autotransformers and regulating transformers, shall be either solidly grounded or grounded through a resistor with an ohmic value not in excess of the values given in Table 3.

Tertiary winding terminals shall be considered as line terminals.

When buried stabilizing winding terminals ~~which are buried and~~ have been temporarily brought out of the tank for testing purposes only, they shall be ~~kept~~ connected ~~in~~ the same way ~~condition~~ as they will be in service during impulse tests (grounded or in open circuit) ~~as foreseen for service~~.

When a stabilizing winding terminal is brought out of the tank for ~~the purpose~~ ~~of~~ grounding purposes ~~the winding~~, this terminal shall be grounded during ~~the entire~~ impulse tests ~~sequence~~.

When stabilizing winding terminals are brought out of the tank for the purpose of grounding the winding and ~~for~~ closing the delta, these terminals shall be ~~grounded and~~ connected as ~~required~~ intended for ~~use in~~ service ~~for~~ during ~~the~~ impulse tests ~~sequence~~.

The rest of the clause remains as is.

- 10.2.4 Tap positions during Switching Impulse Test

10.2.4 Tap connection
The choice of the tap connection shall follow the following rules:

- **The tap position shall be selected in order to induce, as close as possible (preferably within ±3%), the rated switching impulse withstand voltage value on the LV winding terminal;**

- **If the LV winding has no rated switching impulse level, the tap position shall be selected in order to induce, as close as possible (preferably within ±3%), 83% of the LV winding rated BIL value on LV winding terminal.**

It should be noted that for some cases, the LV winding may receive a voltage which is less than its rated switching impulse level or 83% of its rated BIL and this shall be accepted.
It should be also noted that for some other cases, the LV winding may receive a voltage which is higher than its rated switching impulse level or 83%of its rated BIL, this shall be accepted and the transformer shall be designed for it.
For transformers having a preventive autotransformer, the tap changer shall be in a bridging positing if this operational mode is permitted for continuous operation."

This text was approved by the Task Force in Fall 2018 and moved to the Diel Test SC.

- Other possible revisions to subclauses 10.5 to 10.10 from Bill Griesacker's TF (formerly Bertrand Poulin) for revision of low frequency tests. Ongoing work continues.
  - A TF has been formed to look at reducing the limit for PD level Failure Detection in 10.8.5, along with the PD test procedure.
  - Text for venting bushings during PD test. Dave Geibel Study Group

    "If partial discharge is observed during the induced testing of the transformer and appears to be generated within an OIP bushing(s), it is permissible to "vent" the bushing(s) to atmosphere using the bushing manufacturer's instructions to allow for the dissipation of gas

bubbles in the oil. Gas bubbles sometimes form following a temperature rise test during cool down or may be present for other reasons. Reestablishment of the bushing gas space blanket and resealing of the bushing must also be performed in accordance with the bushing manufacturer's instructions following completion of the induced test."

- Clarification of measuring voltage during low frequency tests – Bertrand Poulin
- Class I transformer PD test revision to the test procedure – Don Ayers

- Other possible revisions to subclause 13 on Audible Sound Tests by Ramsis Girgis' Task Force.
- Possible additions from Phil Hopkinson to detect improper core grounding in 10.7.7 for Special Induced-Voltage partial discharge Test for distribution and class I power transformers with a wound core, L-H winding construction and HV >15 kV. PD is to be measured as apparent charge in pico-coulombs (pC). One reading shall be made at the end of each interval. Minimum test duration and application of voltage:

1. Voltage shall be raised to 100% of rated volts for 30 seconds and PD shall be measured and recorded.
2. Voltage shall be raised to 110% of rated volts for 30 seconds and PD shall be measured and recorded.
3. Voltage shall be raised to 150% of rated volts, held for 1 minute and PD shall be measured and recorded.
4. Voltage shall be lowered to 140% of rated volts, held for 1 minute and PD shall be measured and recorded.
5. Voltage shall be lowered to 130% of rated volts, held for 1 minute and PD shall be measured and recorded.
6. Voltage shall be lowered to 120% of rated volts, held for 1 minute and PD shall be measured and recorded.
7. Voltage shall be lowered to 110% of rated volts, held for 10 minutes and PD shall be measured and recorded.

L.3.3 WG Standard Terminal Markings and Connections for Transformers C57.12.70

Motion for continuous revision task force made by Steve Antosz and second by Sheldon Kennedy, and passed it unanimous

L.3.4 WG Standard Transformer Terminology for Transformers C57.12.80

Meeting Minutes / Significant Issues / Comments:

1) Chair's Remarks:

The Chair opened the meeting at 9:30 a.m. on Monday 15 October 2018.
The chair noted the continued low attendance of this working group's meeting to date,

2) Attendance Sign In sheet/ Quorum Check:

Quorum was achieved with five of six members present. 15 non-voting participants also attended.

3) Approval of the Agenda

A motion to approve the agenda was passed unanimously.

4) Call for Essential Patents

A call for essential patents was made. No essential patent issues were reported.

5) Approval of the minutes

A motion to approve the Spring 2018 minutes was made and passed unanimously.

6) Unfinished Business

a) A definition for wind turbine GSU transformers has not been submitted

Action Item: Fredric Friend will contact Phil Hopkinson, to get a suggested wind farm GSU definition for working group consideration.

b) It was suggested to make the current draft of the PC57.12.80 available to the working group for review to stimulate more comments.

Action Item: Secretary Jim Graham will arrange to post PC57.12.80 draft 1.0 on the website in the protected area.

c) Create a task force to review existing standards for definitions to be added to the standard or be modified.

A request for volunteers to review existing standards documents was sent to all technical subcommittees. One subcommittee and one individual responded. Three individuals volunteered to help with the document reviews during the meeting.

7) New Business

a) Lee Matthews reported on the definitions included in C57.15, the step-voltage regulator standard.

b) Criteria for including definitions from other standards documents were discussed. It was noted the scope states common transformer terms should be included. In cases where the same definition will be included in this standard and another document the definitions should match.

c) A task force to conduct a review of existing standards for new definitions was discussed.

A request for volunteers to review existing standards documents was sent to all technical subcommittees. One subcommittee and one individual responded. Three individuals volunteered to help with the document reviews during the meeting.

d) It was suggested liaisons who can monitor developments of standards documents in the technical subcommittees be established to keep this working group informed of new or modified definitions. It was also suggested PC57.12.80 become a continuous revision subgroup.

e) There was a recommendation definition in a new standards document, C57.158, be reviewed.

f) Revised definitions for core form and shell form transformers as written in C57.105 were discussed.

8) The meeting was adjourned at 10:38 a.m.

Next meeting - March 2018 at Anaheim, CA

Submitted by: Jim Graham, Vice-chair

Date: 10/16/2018

L.3.5 IEEE / IEC Continuous Cross Reference

Minutes of the Task Force Meeting Reported by Vinay Mehrotra, TF Chair

The task force meeting was held at 4.45pm on October 15, 2018. 1 of 5 members was present, so a quorum was not achieved, 13 guests also attended, for a total attendance of 14.

This was followed by a presentation on comparison of IEEE standards C57.12.90 & C57.12.00 and IEC standards 60076-5 for short circuit tests by Shankar Subramany of KEMA Laboratories.

The task force meeting was adjourned at 5.46 pm.

Encl: Short-circuit test comparison

L.4 Old Business

There was no old business discussed.

L.5 New Business

L.5.1 Jerry Murphy, Chair, re-open C57.152 under a task force and Marcos Ferreira will be the Chair

L.6 Adjournment

The meeting and was adjourned at 5:25 PM EDT.

Respectfully submitted by Marcos Ferreira, Standards SC Secretary

Annex M Subsurface Transformers & Network Protectors Subcommittee

October 17, 2018
Jacksonville, Florida
Chair: Dan Mulkey
Vice Chair: George Payerle

M.1 Meeting Administration

Introductions – The meeting was called to order at 11:00 AM Wednesday, October 17, 2018 in the Grand Ballroom 1 of the Hyatt Regency Jacksonville Riverfront Hotel in Jacksonville, Florida. Introductions were made and sign-in sheets were routed. The meeting agenda was approved.
Quorum – The members were listed on the screen and by a show of hands, it was determined that there was a quorum in attendance.
Members and Guests --There were 21 members and 33 guests in attendance. Their names can be found in the AM system. Pre-meeting membership changes: Israel Barrientos and Jeremy Van Horn were approved for membership.
Approval of Minutes – The minutes from the Spring 2018 meeting in Pittsburgh, PA were approved. They were motioned for approval by Alex Macias and seconded by Brian Klaponski. The subcommittee approved these without opposition.

The chair noted that this SC will now include a report by the newly formed PC57.167 which reports to both the Distribution Transformer SC and STNP subcommittee.

M.2 Membership List

First Name Last Name (Company Name)
Jason Attard (Consolidated Edison Co. of NY)
Israel Barrientos (Prolec GE)
David Blew (PSE&G)
Jermaine Clonts (Power Partners)
Douglas Craig (Richards Manufacturing Co.)
John Crotty (Ameren)
Larry Dix (Quality Switch, Inc.)
James Dorsten (Alabama Power)
Mark Faulkner (EATON Corporation)
Carlos Gaytan (Prolec GE)
Said Hachichi (Hydro-Quebec)
Michael Hardin (H-J Enterprises, Inc.)
Thomas Holifield (Howard Industries)
Brian Klaponski (Carte International Inc.)
Alejandro Macias (CenterPoint Energy)
Charles Morgan (Eversource Energy)
Daniel Mulkey (Mulkey Engineering Inc.)
George Payerle (Carte International Inc.)
Clemens Reiss IV (Custom Materials, Inc.)
Pedro Salgado (Electronic Technology Inc.)
Adam Sewell (Quality Switch, Inc.)
Jeremy Sewell (Quality Switch, Inc.)
Igor Simonov (Toronto Hydro)
Travis Spoone (EATON Corporation)
Robert Stinson (General Electric)
Wes Suddarth (Nashville Electric Service)
Giuseppe Termini (PECO Energy Company)
Michael Thibault (Pacific Gas & Electric)
Alan Traut (Howard Industries)
Jeremy Van Horn (IFD Corporation)
John Vartanian (National Grid)
Joshua Verdell (ERMCO)
Lee Welch (Georgia Power Co.)
William Wimmer (Dominion Energy)
Kwasi Yeboah (GE Energy Management)

M.3 Working Group and Task Force Reports

M.3.1 C57.12.23 Working Group Report – Single-Phase Submersible Transformer

Alan Traut, Chairman, George Payerle, Acting Secretary.
Revision Due Date**: 3/19/2019**
PAR Approval Date: **8/21/2014**
PAR Expiration Date: **12/31/2018**

The meeting was called to order at 9:30 AM in Grand Ballroom 1 at the Hyatt Regency Riverfront in Jacksonville, Florida.

Everyone was asked to introduce themselves. Rosters were sent around. Twenty-one members were in attendance, which constituted a quorum. Must attend 2 meetings in a row to be a member. Miss 2 meetings in a row and you are no longer a member. Contact the chair if you have a valid excuse for missing a meeting and wish to remain a member.

The chair asked if there were any essential patent claims that needed to be disclosed. There were none.

Fred Friend moved to approve the agenda and Said Haichichi seconded. Motion carried. The minutes from the Pittsburgh meeting were presented. Alex Macias moved to approve, Shelby Walters seconded. Motion carried.

The Chair summarized the results of the ballot:
Initial ballot of draft D7 closed July 25, 2018
72 balloters (27 Producer, 14 user, 13 consultant, 18 all others)
66 returned, 91% (75% required)
64 votes with 2 abstentions
62 affirmative, 96% (75% minimum)
2 negative
25 comments, 6 negatives must be satisfied.
Comments resolved and included in D8.

Recirculation ballot of draft D8 closed September 8, 2018
64 affirmative (100%)
4 editorial comments to be addressed during publication

Following the successful recirculation ballot, PC57.12.23/D8 submitted to RevCom September 15, 2018 and has been placed on the December 2018 RevCom agenda.

The chair summarized the changes that resulted when the negative ballots were resolved. Brian Klaponski noted that figures are sometimes reduced in size and become difficult to read during the publication process.

Draft D8 should be approved by RevCom within the next few months. The Par expires in December 2018. Just to be safe, the chair applied for a Par extension but we shouldn't need it. The PAR extension request is on the December 2018 NesCom agenda.

The chair stated that 12.23 will go into hiatus and that we will offer our time slot to 12.24 which involves most of the same people. Once their work is complete, 12.23 will resume in approximately 5 years.

The meeting was adjourned at 9:55.

M.3.2 Continuous Revision of C57.12.24 – Three-Phase Submersible Transformers

Giuseppe Termini, Chairman; George Payerle Secretary
Approved: **12/7/2016**
Revision Due Date: **12/7/2026**
PAR Approval Date:
PAR Expiration Date: N/A

Members present
Giuseppe Termini – (Chairman) PECO (Exelon)
Jason Attard – ConEd
Israel Barrientos – Prolec GE
Piotr Blaszczyk, The Specialty Switch Co.
David Blew – PSE&G
Rhett Chrysler, ERMCO
Douglas Craig – Richards Mfg
Thomas Dauzat – GE
Craig DeRouen - ERMCO
Will Elliott – GE
Carlos Gaytan – Prolec GE
Said Hachichi – Hydro Quebec
Mike Hardin – H-J Enterprises
Brian Klaponski - CARTE International Inc.
Alejandro Macias - CenterPoint Energy
Cory Morgan – Eversource Energy
Dan Mulkey – Mulkey Engineering Inc.
George Payerle – Carte International Inc.
Jarrod Prince- ERMCO
James Ratty – Electronic Technologies. Inc.
Pedro Salgado – Electronic Technology Inc.
Igor Simonov - Toronto Hydro
Babanna Suresh – Southwest Electric Co.
Mike Thibault – PG&E
Alan Traut – Howard Industries
Jeremy Van Horn – IFD

Guests present
*Glenn Andersen – Fayetteville PWC
*Daniel Berler – ZTZ Services International
Kevin Biggie – Weidmann Electrical Technology
Alan Boege – Orto de Maxico
*Eric Bradford – GE
Danny Diaz – Commonwealth Associates
Alexander Ebbert – ZTZ Services International
Pam Edwards – Central Moloney
Matthew Enders – Oncor Electric Delivery
Yamille del Valle – NEETRAC
Mike Faulkenberry - Retired
Sanford Fong – GA Power
Jean-Francois Gagnon – Siemens
Fred Friend – AEP
John Garrity – Tagup Inc.
Jorge Gonzales de la Vega – Orto de Mexico
*Ken Hampton – BGE
*Jack Harley – FirstPower Group LLC
*Brad Kittrell – ConEd
Brian McBride -- Cargill
Justin Minikel – Eaton
*Michael Morgan – Duke Energy
Tim Morris – Walton EMC
Roger Owens – Central Moloney
*Juan Ramirez -- CELECO
Jeremy Sewell – Quality Switch
Russ Sewell – Quality Switch
*Liz Sullivan – Dominion Power
Philip Sullivan – Power Partners Inc.
Tim Tillery – Howard Industries
*Reinaldo Valentin - Duke Energy
Shelby Walters – Howard Industries
Lee Wellingham – Central Moloney
Alan Wilks – Wilks Consulting
* = requests membership

The meeting was called to order at 1:45 pm on Tuesday, October 16, 2018 in the Grand Ballroom 1 of the Hyatt Regency Riverfront Hotel in Jacksonville, FL. George Payerle acted as recording secretary.

Introductions were made. The Chair stated that the membership stands at 38. With 26 members in attendance there was a quorum at this meeting. There were 34 guests in attendance. Ten (10) guests requested membership. The chair stated that adjustments to the membership will be made based on attendance. The chair asked if there were any essential patents to be disclosed. There were none.

An agenda was presented. Brian Klaponski moved to accept the agenda and Jeremy Von Horn seconded the motion. The motion passed unanimously. The minutes of the previous meeting held on March 27, 2018 in Pittsburgh, PA were presented. Dan Mulkey moved to accept the minutes as presented and Al Traut seconded the motion. The motion passed unanimously.

The latest revision of C57.12.24 was published in 2016 and will expire in 10 years and to officially start the next revision process of the standard, a Project Authorization Request (PAR) will be submitted early next year.

The action items from the previous meeting in Pittsburgh were discussed. Tom Dauzat presented the results of the Task Force on material compatibility between the transformer tank and the hardware and/or components that are either attached or welded to the tank; e.g.: parking stands, drain valves, PRVs, etc. The presentation consisted of transformer photos submitted by various users. Tom made recommendations on how to determine which materials were compatible with each other and how to make choices. For example, the combination of silicon bronze hardware on copper bearing steel tank will generate corrosion. In general, galvanic potential should not exceed 0.2 volts between two (2) dissimilar materials. The recommendation of the Task Force regarding material requirements for the tank, hardware and components was summarized in the Submersible Transformer Galvanic Application Compatibility (STGAC) chart. The chart details material recommendation for hardware and components based on the transformer tank material. The presentation along with the STGAC chart will be posted in the IEEE Transformer Committee website under the Subsurface Transformers and Network Protector Subcommittee page. The WG recommended that the Task Force continues the work to finalize the STGAC chart so that it can be incorporated in the next standard revision. It was also agreed to expand the scope of the Task Force to address tank material as it relates to corrosion. Tom Dauzat will continue to lead the Task Force; Will Elliott, Alex Macias, Babanna Suresh and Cory Morgan will assist Tom in finalizing the chart and address tank material.

Jeremy Van Horn summarized the results of the review of the Metric and English values shown in Table 6 of the standard. Jeremy mentioned that the number of decimal values for both Metric and English were not consistent. Two (2) options were presented to correct this discrepancy. The WG recommended that Jeremy Van Horn and Israel Barrientos continue to work on the Metric and English values and make recommendations to correct Table 6. The recommendation should include using values that are consistent with industry requirements for steel material thickness and be in compliance with IEEE standard C57.144.

Under new business, the Chair stated that the WG participants, both members and guests, should review the standard and submit changes for inclusion in the next standard revision. For example, the Chair stated that the requirements for the accessories shown in the standard should be reviewed and perhaps expanded similar to the requirements proposed in C57.12.34, Standard for Pad-Mounted, Compartmental-Type, Self-Cooled, Three-Phase Distribution Transformers

The Chair asked for volunteers to review any section of the standard and to determine if any changes need to be made. Israel Barrientos, Tom Dauzat, Will Elliot and Dan Mulkey volunteered to review the standard for any possible changes. Brian Klaponski volunteered to have his engineering staff at CARTE review the standard for any possible changes. Any changes suggested will be coordinated through the Chair for review at the next WG meeting.

The Purpose and Scope of the standard were reviewed. After a discussion to expand the Scope of the standard from 3750 KVA to 5000 KVA, it was agreed to keep the Scope as is. Dan Mulkey moved to accept

the Purpose and Scope, for the PAR submission, as they are. Cory Morgan seconded and the motion it was approved.

The meeting was adjourned at 3:00 PM. The next meeting will be in Anaheim, CA on March 26, 2018.
Respectfully Submitted by: Giuseppe Termini, Chairman C57.12.24 Working Group

At the Subcommittee meeting there was unanimous approval of the motion of the Working Group to proceed with submitting the PAR.

M.3.3 Continuous Revision of C57.12.40 – Secondary Network Transformers

Brian Klaponski, Chairman; Giuseppe Termini, Secretary
Revision Due Date: **12/31/2027**
PAR Approval Date:
PAR Expiration Date: **N/A**

a. **Members Present**	**Company**
Brian Klaponski (Chairman)	Carte International Inc.
Jason Attard	ConEd
Piotr Blaszczyk	The Specialty Switch Co.
Dave Blew	PSE&G
Larry Dix	Quality Switch
Will Elliott	GE
Mark Faulkner	Eaton Corp.
Alejandro Macias	CenterPoint Energy
Cory Morgan	Northeast Utilities
Dan Mulkey	Consultant
George Payerle	Carte International Inc
Steve Schroeder	ABB Inc.
Adam Sewell	Quality Switch
Jeremy Sewell	Quality Switch
Russell Sewell	Quality Switch
Igor Simonov	Toronto Hydro
Liz Sullivan	Dominion Energy
Giuseppe Termini	PECO (Exelon)

b. **Guests Present**	**Company**
Kevin Biggie	Weidmann Electrical Technology
Mike Bonn	Soltex
*Eric Bradford	GE
*Douglas Craig	Richards Manufacturing Co.
*Tom Dauzat	GE
Mohamad El Masri	Southern California Edison
*Matthew Enders	Oncor Electric Delivery
Sanford Fong	GA Power
Ben Garcia	Southern California Edison
Jonathan Garrity	Tagup Inc
*Brad Kittrell	ConEd
Steve Korte	Cargill, Inc.

Jinesh Malde	M&I Materilas Inc.
Brian McBride	Cargill, Inc.
Justin Minikel	EATON Corp.
John Owen	Powertech Labs. Inc.
*James Ratty	Electronic Technology Inc.
*Pedro Salgado	Electronic Technology Inc.
*Dan Schwartz	Quality Switch
Jeff Valmus	Cargill, Inc.

*Requested Membership

1) The group met on Tuesday, October 16, 2018 at 11:00 am with 18 members and 20 guests. Eight (8) guests requested membership.

2) Giuseppe Termini acted as the recording secretary for the meeting minutes.

3) An agenda was presented and approved, and introductions were made.

4) The Chair asked if there were any patent claims that needed to be mentioned. There were none.

5) The minutes of the March 27, 2018, meeting in Pittsburgh, PA were reviewed. Alex Macias made a motion to approve those Minutes. Jeremy Sewell seconded the motion and the minutes were approved unanimously.

6) The Chair announced that as of the end of this meeting Dave Blew will become the Chairman of the Working Group. Dan Schwartz volunteered to be the next recording secretary.

7) The Chair briefly talked about the presentations made by Patrick Ho of Powertech and Jason Attard and Jane Shin of ConEd at the last two meetings.

8) The Chair stated that in order to proceed to the start of the next revision of this Standard that a PAR must be submitted. A PAR will be submitted by Dave Blew in January 2018. To submit the PAR, the Purpose and Scope of the standard were reviewed.

9) The Purpose of the standard was reviewed, and after a discussion regarding the mechanical interchangeability and safety wording in the Purpose, a motion was made by Dave Blew to keep the Purpose as it is. The motion was seconded by Dan Mulkey and it was approved unanimously.

10) The Scope of the standard was also reviewed. Dave Blew made a motion to keep the Scope as it is. The motion was seconded by Cory Morgan and it was approved unanimously.

11) The Chair asked for the formation of a Task Force to address corrosion issues related to the transformer tank material. After a discussion, it was agreed to expand the existing Task Force of C57.12.24 to include tank material requirements to address the corrosion issue. A motion was made by Tom Dauzat that: “For the purpose of C57.12.24 and C57.12.40, the scope of

the C57.12.24 Task Force will be expanded to include tank material to address corrosion based on the transformer applicability for both standards, C57.12.24 and C57.12.40". The motion was seconded by Will Elliot and it was unanimously approved.

12) The Chair discussed two other topics to be considered for inclusion in the next standard revision:

   a. The formation of a Task Force to address Cathodic protection in an Informative Annex
   b. Reconsider an alternate location of the primary network switch in the main transformer tank in order to address historical high incidents of catastrophic switch failures as reported by the users.
   c. An option without a switch was also brought up and Alex Macias reminded the group that he had previously made the same request, and at that time it was elected to address it during the next revision.

13) The meeting was adjourned at 12:04 pm with the next meeting set for Anaheim, CA on March, 26, 2019.

Respectfully submitted
B. Klaponski, Chairman
At the Subcommittee meeting there was unanimous approval of the motion of the Working Group to proceed with submitting the PAR.

M.3.4 -C57.12.44 Working Group Report – Secondary Network Protectors

Revision Due Date: **12/31/2024**
PAR Approval Date: **3/26/2015**
PAR Expiration Date: **12/31/2019**

Document #: **C57.12.44**

Document Title: **STANDARD REQUIREMENTS FOR SECONDAY NETWORK PROTECTORS**

Chair: **Mark Faulkner** **Vice-Chair** **Alex Macias**
Secretary

Current Draft Being Worked On: **DRAFT 10** **Dated:** **Sept. 18, 2018**

Meeting Date: **October 15, 2018** **Time:** **4:45PM**

Meeting Attendance

Activity Name: C57.12.44 WG Secondary Network Protectors
Activity ID: 703
Number of Members in Activity = 17
Number of Members Present = 13
Quorum Present = 76.5%
Number of attendees = 27

Meeting Minutes / Significant Issues / Comments:

The minutes shall record the essential business of the Working Group, including the following items at a minimum:

1. Call to order and any Chair's remarks
    a. 4:48PM
    b. Focus on review draft for preparation for Ballot and MEC

2. Quorum Verification
    a. Quorum was confirmed by show of hands

3. Confirmation of the essential patent statement and responses
    a. No conflicts presented to group

4. Approval of minutes of the previous meeting
    a. Motion made by Douglas Craig, 2nd, David Blew
    b. Minutes approved

5. Approval of agenda for this meeting.
    a. Motion made by Douglas Craig, 2nd, Dan Mulkey
    b. Minutes approved

6. Technical topics
    a. Brief summary of the discussion and any conclusions reached.
    b. Motions, including the names of mover and seconder as well as the result of the vote.
        i. Douglas Craig requested the minutes from the previous meeting be edited to reflect the 7.5 percent minimum trip source (obtained from Secondary Network Section of the Underground Systems Reference Book)
            1. Motion made by Craig and 2nd by Cory Morgan
            2. Motion passed
        ii. Dan Mulkey made a motion to go to ballot
            1. Motion made by Craig, 2nd by Dan
            2. Motion passed
        iii. Dan Mulkey made a motion to go to create a ballot resolution group to have authority to make corrections and present at next meeting
            1. Motion made by Craig, 2nd by Dan
            2. Motion passed
            3. Review panel: Dan, Blew, Mark, Alex
        iv. Cory Morgan noted thermocouples need to be changed on figure 1 to thermal sensors versus thermal couples
        v. Discussion held on network side terminal bases
            1. Drawings agreed to by both vendors present
            2. Dan Mulkey requested the model names noted under the terminal base be removed and placed in a footnote

vi. Igor mention inclusion of 600V table for protectors
    1. It was noted that it was approved and noted in previous minutes.
        a. 600V table to be added
vii. Discussion held on timeline for getting document to RevCom.

7. Spring meeting--date and location
    a. Anaheim, CA
    b. Date: March 24-28, 2019

Copies of any handouts and/or subgroup reports will be made available as separate items but referenced by these minutes.

Submitted by: Mark Faulkner
Date: 10/16/2018

At the Subcommittee meeting there was unanimous approval of the motion of the Working Group to proceed to ballot.

M.3.5 -C57.167 Working Group Report – Monitoring Distribution Transformers

Gary Hoffman, Chairman, Mike Thibault, Secretary
Revision Due Date: **N/A – new standard**
PAR Approval Date: **6/14/2018**
PAR Expiration Date: **12/31/2022**

Document #:	**PC57.167**		
Document Title:	**Guide for Monitoring Distribution Transformers**		
Chair:	**Gary Hoffman**	**Vice-Chair**	**Mike Thibault**
Secretary	**See below**	**Per Cent Complete**	
Current Draft Being Worked On:	**NA**	**Dated:**	
Meeting Date:	**16 October 2018**	**Time:**	**4:45 til 5:50PM**
Attendance:	**Members**	**51**	
	Guests	**44**	
	Total*	**95**	

*** For details of attendance, please refer to AMS system of the Transformers Committee**

Draft Meeting Minutes / Significant Issues / Comments:

1. Call to order and any Chair's remarks – Called to Order at 4:45PM by Gary Hoffman
2. Quorum Verification – All participants we informed of the option to request membership of the Task Force by indicating in the Rosters being circulated.
3. Confirmation of the essential patent statement and responses – No patents were discussed or disclosed to the Chain or the Vice as of the submittal of these minutes

4. Approval of agenda for this meeting. No Objections Motion by Jerry Murphy, Second by Al Traut– Unanimously Approved
5. Call for WG Secretary: Post meeting, Gustavo Leal volunteered appointed by the Chair
6. Technical topics introduced by Chair followed by discussion of each
    a. Review of WG's Scope/PAR
    b. (Introduction of Suggested Clauses to the Guide – Not in order of Guide to be developed)
        i. Justification for monitoring – Discussion centered on Safety, Resiliency, Reliability
        ii. Key monitoring parameters and their tolerances
        iii. Method of alert – Audible and/or visible local alarming
        iv. Telemetry – Transmission of information to those which should then take action.
        v. Monitor enclosure integrity and user access – How the Monitoring Device Enclosure should be constructed
        vi. Installation – How the Monitoring Devices should be installed – Discussion concerning some Utility Regulatory Commissions accepting monitor Reporting in lieu of on-site inspections (Rick Cantrell).
        vii. Obligatory - Overview/Normative Reference/Definitions Clauses
7. New business (members on Task Forces as well as presenters are shown below as Table 1)
    a. Motions for establishing Task Forces for Suggested Clauses
    b. Motion to form Task Force (TF) for 6.b.i (Justification for Monitoring) development of Clause – Dan Mulkey – Made Motion – Seconded by Steve Shull Motion Passed unanimously. Dan Mulkey to Chair TF. Call for Member participants in TF.
    c. Motion to form Task Force (TF) for 6.b.ii (Key Monitoring parameters and tolerances) development of Clause – Jerry Murphy – Made Motion – Seconded by Steve Shull Motion Passed unanimously. Jerry Murphy to Chair - Call for Member participants in TF
    d. Motion to form Task Force (TF) for 6.b.iii and iv (Method of Alert and Telemetry) development of Clause – Mike Thibault – Made Motion – Seconded by Said Hachichi Motion Passed unanimously. Mike Thibault to Chair - Call for Member participants in TF
    e. It was agreed to Table action on clause for enclosue integrity and access along with the clause on installation
    f. General – Between Fall 2018 Jacksonville and 2019 Anaheim Meeting the expectation is that these TFs formed in 7.b thru d will schedule via a "Doodle Poll" and meet via "Web-Conference Call) and develop a draft proposal for the working group to review and discuss at the Anaheim Meeting.
    g. Discussion of the followed concerning Utilities and Manufacturing members of the Working Group to provide short presentations at the next meeting in Anaheim on what "State of the Art" Monitoring for Distribution Class Transformers. Volunteers for this were:
        i. PSE&G – David Blew
        ii. ConEdison – Bradley Kittell/Jason Attard
        iii. Qualitrol – Hakim Dulac
        iv. Pacific Gas and Electric –Mike Thibault
        v. Dupont – Mark Scarborough
        A doodle poll will be issued to decide on meeting dates prior to and just after Thanksgiving and perhaps after the New Year
8. Next face to face meeting – Anaheim, California March 24 thru 28 – 2019. A Web meeting may be called if needed
9. Adjournment

Table 1

	Task Force 1 – Justification Clause	Task Force 2 – Monitor Clause
Chair	Daniel Mulkey with Mulkey Engineering Inc.	Jerry Murphy with Reedy Creek Energy Services
Member	Stephen Shull with North Fork SE, LLC	Roger Fenton with Fenton Solutions
Member	John Chisholm with IFD Corporation	Rick Cantrell with Sunbelt Transformer
Member	Jeff Benach with Weidmann	Jeremy Van Horn with IFD Corporation
Member	Douglas Craig with Richards Manufacturing Co	Jason Attard with Consolidated Edison Co. of NY
Member		Hakim Dulac with Qualitrol Company LLC
Member		Brian Klaponski with Carte International Inc.
Member		Brad Kittrell with Consolidated Edison Co. of NY
Member		Babanna Suresh with Southwest Electric Co.

Table 1A

	Task Force 3 – Method and Telemetry	Presenter
Chair	Michael Thibault with Pacific Gas & Electric	
Member	William Whitehead with Camlin Power	Jason Attard with Consolidated Edison Co. of NY
Member	Jason Attard with Consolidated Edison Co. of NY	Michael Thibault with Pacific Gas & Electric
Member	Brian Klaponski with Carte International Inc.	Mark Scarborough with DuPont
Member	Audrey Siebert-Timmer with IFD Corporation	David Blew with PSE&G
Member	Kwasi Yeboah with General Electric	Brad Kittrell with Consolidated Edison Co. of NY

There were no Handouts for this Meeting

Submitted by: Mike Thibault (Vice Chair)

Date: 10/17/2018

M.4 Old Business

none

M.5 New Business

At the end of the meeting the chair recognized Brian Klaponski for his long service as chair of C57.12.40.

Gary Hoffman reported that the deadline for submitting PARs for the first NesCom meeting of 2019 is December 18, 2018. The chair then noted that the PARs should be submitted by then to get the maximum life out the PAR.

The chair announced his intention to resign as SC chair effective at the end of this meeting, and that George Payerle was willing to take on the duties of SC Chair. George asked that anyone interested in becoming a Secretary or Vice-Chair to let him know. Following the meeting the chair contacted Sue McNelly and confirmed the change.

The meeting was adjourned at 11:45 with the next meeting to take place on March 27, 2019 in Anaheim, CA.