

IEEE/PES Transformers Committee

Spring 2023 Meeting Minutes

Milwaukee, Wisconsin

March 19-23, 2023

Unapproved

(These minutes are on the agenda to be approved at the next meeting in Fall 2023)

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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 – Eric Weatherbee
- Annex B. Dielectric Tests SC – Poorvi Patel
- Annex C. Distribution Transformers SC – Jerry Murphy
- Annex D. Dry Type Transformers SC – Casey Ballard
- Annex E. HVDC Converter Transformers & Smoothing Reactors – Ulf Radbrandt
- Annex F. Instrument Transformers SC – Thomas Sizemore
- Annex G. Insulating Fluids SC – Scott Reed
- Annex H. Insulation Life SC – Sheldon Kennedy
- Annex I. Meetings SC – Tammy Behrens
- Annex J. Performance Characteristics SC – Rogerio Verdolin
- Annex K. Power Transformers SC – Ryan Musgrove
- Annex L. Standards SC – Dan Sauer
- Annex M. Subsurface Trans & Network Protectors SC – George Payerle

General Administrative Items

1 AGENDA

Opening Session

Monday, March 20, 2023: 8:00 am - 9:15 am CDT (UTC-06:00)

(Attendance recorded by roster – attendance required to maintain Member status)

1. Welcome and Announcements Ed teNyenhuis
2. Meeting Minute Tammy Behrens
3. Approval of Agenda Ed teNyenhuis
4. Approval of Minutes from Fall 2022 Meeting Ed teNyenhuis
5. Chair's Report & Administrative Subcommittee Report Ed teNyenhuis
6. Vice Chair's Report David Wallach
7. Secretary's Report Bill Griesacker
8. Treasurer's Report Troy Tanaka
9. Standards Report Steve Shull
10. Liaison Representative Reports
 - 10.1. CIGRE Craig Swinderman
 - 10.2. IEC TC-10 Ed Casserly
 - 10.3. IEC TC-14 Christoph Ploetner
 - 10.4. Standards Coordinating Committee, SCC4 (Electrical Insulation) Evanne Wang
 - 10.5. ASTM Ed Casserly
 - 10.6. Transactions on Power and Delivery (TPWRD) Editor Liaison Xose Lopez-Fernandez
11. Hot Topics for the Upcoming Week Subcommittee Chairs
12. New Business & Wrap-up Ed teNyenhuis

Closing Session

Thursday, March 23, 2023: 11:00 am - 12:00 pm CDT (UTC-06:00)

1. Chair's Remarks and Announcements Ed teNyenhuis
2. Meetings Planning Subcommittee Tammy Behrens
3. Reports from Technical Subcommittees (decisions made during the week)
 - 3.1. Transformers and Reactors for HVDC Applications Ulf Radbrandt
 - 3.2. Instrument Transformers Thomas Sizemore
 - 3.3. Insulating Fluids Scott Reed
 - 3.4. Insulation Life Sam Sharpless
 - 3.5. Performance Characteristics Rogerio Verdolin
 - 3.6. Power Transformers Ryan Musgrove
 - 3.7. Standards Dan Sauer
 - 3.8. Subsurface Transformers & Network Protectors George Payerle

- 3.9. Bushings Eric Weatherbee
- 3.10. Dielectric Tests Poorvi Patel
- 3.11. Distribution Transformers Jerry Murphy
- 3.12. Dry Type Transformers Casey Ballard
- 4. Additional Report from Standards Coordinator (issues from the week) Steve Shull
- 5. New Business (continued from Monday) and Wrap-up Ed teNyenhuis

2 ATTENDANCE

2.1 COMMITTEE MEMBER ATTENDANCE

The following table lists all Committee Members who signed the attendance sheet at the opening or closing session meetings. See section 2.2 for a list of non-Committee Members who signed the attendance sheet at these meetings.

Committee Member Attendance:

First Name	Last Name	Company Name	Monday 3/20/23	Thursday 3/23/23
Gregory	Anderson	GW Anderson & Associates, Inc.	X	X
Tauhid Haque	Ansari	Hitachi Energy	X	X
Stephen	Antosz	Stephen Antosz & Associates, Inc.	X	
Javier	Arteaga	Hitachi Energy	X	X
Donald	Ayers	Ayers Transformer Consulting, LLC	X	X
Robert	Ballard	DuPont	X	X
Gilles	Bargone	FISO	X	
Barry	Beaster	The H-J Family of Companies	X	X
Enrique	Betancourt	prolec ge	X	X
Kevin	Biggie	Weidmann Electrical Technology	X	X
Wallace	Binder	WBBinder Consultant		X
Daniel	Blaydon	Baltimore Gas & Electric	X	X
W	Boettger	Boettger Transformer Consulting LLC	X	X
Darren	Brown	Howard Industries, Inc.	X	X
Thomas	Callsen	Weldy Lamont Assoc.	X	X
Juan	Castellanos	Prolec GE	X	X
Rhett	Chrysler	ERMCO	X	X
Craig	Colopy	Retired	X	X
Thomas	Dauzat	AEP-SWEPCO	X	X
Eric	Davis	Burns & McDonnell	X	X
J.Arturo	DelRio	Siemens Energy Inc.		X
Stephanie	Denzer	Weidmann Electrical Technology	X	X
Scott	Digby	Duke Energy	X	
Hakim	Dulac	Advanced Power Technologies	X	
Evgenii	Ermakov	Hitachi Energy	X	X
Marcos	Ferreira	Bridge View Resources	X	X
Hugo	Flores	Hitachi Energy	X	
Marc	Foata	Maschinenfabrik Reinhausen GmbH	X	
Bruce	Forsyth	Bruce Forsyth and Associates, PLLC	X	
Eduardo	Garcia	Siemens Energy	X	X
James	Gardner	Prolec-GE Waukesha	X	X
Carlos	Gaytan	Prolec GE	X	

Ali	Ghafourian	H-J Enterprises	X	
Saurabh	Ghosh	GE	X	X
Ramsis	Girgis	Hitachi Energy	X	X
William	Griesacker	W. Griesacker & Associates Inc.	X	
Attila	Gyore	M&I Materials Ltd	X	X
Kenneth	Hampton	bge	X	
John	Harley	FirstPower Group LLC	X	X
Roger	Hayes	General Electric	X	X
Ronald	Hernandez	Doble Engineering	X	X
John	Herron	Raytech USA	X	X
Philip	Hopkinson	HVOLT Inc.	X	X
John	John	Virginia Transformer Corp.	X	X
Akash	Joshi	Mott Macdonald	X	
Kurt	Kaineder	Siemens Energy	X	
Sheldon	Kennedy	Niagara Transformer Corp	X	
Gary	King	Howard Industries	X	
Brian	Klaponski	Carte International Inc	X	X
Marek	Kornowski	Polycast	X	X
Krzysztof	Kulasek	Delta Star Inc.	X	
Fernando	Leal	Prolec	X	
Aleksandr	Levin	Weidmann Electrical Technology	X	
Weijun	Li	Braintree Electric Light Department	X	X
Colby	Lovins	Federal Pacific	X	X
Tim-Felix	Mai	Siemens Energy Global GmbH & Co. KG	X	
Jinesh	Malde	M&I Materials Inc.	X	X
Kumar	Mani	Duke Energy Inc	X	X
Lee	Matthews	Howard Industries, Inc.	X	
Daniel	Mulkey	Mulkey Engineering Inc	X	X
Jerry	Murphy	RCES	X	X
David	Murray	Tennessee Valley Authority	X	X
Ryan	Musgrove	OG&E	X	X
Shankar	Nambi	Bechtel Energy, Inc.	X	
Aniruddha	Narawane	Eaton	X	
Dwight	Parkinson	Eaton Corp	X	X
Sanjay	Patel	Royal Smit Transformers	X	
Poorvi	Patel	EPRI	X	X
George	Payerle	Carte International	X	X
Nicholas	Perjanik	Weidmann Electrical Technology	X	X
Klaus	Pointner	Trench Austria GmbH	X	X
Bertrand	Poulin	Hitachi Energy	X	X
Tom	Prevost	Weidmann Electrical Technology Inc.	X	X
Ulf	Radbrandt	Hitachi Energy	X	
Martin	Rave	ComEd	X	X
Scott	Reed	MVA	X	X
Diego	Robalino	Megger	X	X
Marnie	Roussell	Entergy	X	X
Mickel	Saad	Hitachi Energy	X	X
Hakan	Sahin	Virginia Transformer Corp.	X	
Dinesh	Sankarakurup	Duke Energy		X
Amitabh	Sarkar	Virginia Transformer Corp	X	
Daniel	Sauer	Eaton	X	X
Alan	Sbravati	Hitachi Energy	X	X
Ewald	Schweiger	Siemens Energy	X	X
Pugazhenth	Selvaraj	Virginia Transformer Corp	X	X

Cihangir	Sen	Duke Energy	X	X
Jeremy	Sewell	Quality Switch, Inc.	X	X
ADAM	SEWELL	QUALITY SWITCH INC	X	X
Michael	Sharp	Trench Limited	X	X
Samuel	Sharpless	Rimkus Consulting Group	X	X
Hemchandra	Shertukde	www.diagnostic-devices.com	X	X
Stephen	Shull	BBC Electrical Service Inc.	X	X
Thomas	Sizemore	ABB	X	
Kenneth	Skinger	Scituate Consulting, Inc.	X	
James	Smith	The H-J Family of Companies	X	
Steve	Snyder	Retired	X	X
William	Solano	Reinhausen Manufacturing Inc.	X	X
Sanjib	Som	PENNSYLVANIA TRANSFORMER TECHNOLOGY INC	X	X
Thomas	Spitzer	City Transformer Service Co.	X	
Mike	Spurlock	Spurlock Engineering Services	X	X
Markus	Stank	Maschinenfabrik Reinhausen GmbH	X	
David	Stankes	3M	X	
Kyle	Stechsulte	American Electric Power	X	X
Kerwin	Stretch	Siemens Energy	X	
Charles	Sweetser	OMICRON	X	
Craig	Swinderman	Mitsubishi Electric Power Products, Inc.	X	X
Janusz	Szczechowski	MASCHINENFABRIK REINHAUSEN GMBH	X	
Troy Alan	Tanaka	Burns & McDonnell	X	
Joseph	Tedesco	Hitachi Energy USA	X	X
Vijay	Tendulkar	EATON		X
Ed	TeNyenhuis	Hitachi Energy	X	X
Mike	Thibault	Pacific Gas and Electric	X	X
Timothy	Tillery	HOWARD INDUSTRIES	X	X
Mark	Tostrud	Dynamic Ratings	X	X
Alan	Traut	Howard Industries	X	
Ajith	Varghese	Prolec GE Waukesha	X	X
Joshua	Verdell	ERMCO	X	X
Dharam	Vir	Prolec GE Waukesha	X	X
David	Wallace	Mississippi State University	X	
David	Wallach	Duke Energy	X	X
Joe	Watson	JD Watson and Associates	X	X
Eric	Weatherbee	PCORE Electric	X	X
Bruce	Webb	Knoxville Utilities Board	X	X
Drew	Welton	intellirent	X	
Jeffrey	Wright	Duquesne Light	X	X
Peter	Zhao	Hydro One	X	X
Kris	Zibert	Allgeier Martin & Associates	X	
Waldemar	Ziomek	PTI Transformers LP	X	X

Based upon the above attendance totals:

Quorum was achieved at Monday Opening Session (125/207=60%).

Quorum was not achieved at Thursday Closing Session (89/207=43%).

2.2 GENERAL ATTENDANCE

The following table lists all non-Committee Members that signed the attendance sheet at the opening and closing session meetings. See section 2.1 for a list of Committee Members who signed the attendance sheet at the opening and closing session meetings.

Non-committee member attendance:

First Name	Last Name	Company Name	Monday 3/20/23	Thursday 3/23/23
Mubarak	Abbas	Siemens Energy		X
Kayland	Adams	Prolec GE Waukesha	X	X
Ahmed	AlAhmed	Evergy-Wolf Creek	X	X
REHAN	ALI	Siemens Energy, Inc.	X	
Nabi	Almeida	Prolec GE USA	X	
Carlos Hernan	Alonso Martinez	Arteche	X	
Mihirkumar	Amin	Eaton Corporation		X
Elise	Arnold	Starkstrom Gerätebau GmbH	X	X
Kush	Arora	Reinhausen (MR)	X	
Robert	Arritt	EPRI	X	
Alejandro	Ayala	PowerPartners	X	X
Cheryl	Basel	WEG Transformers	X	
Jared	Bates	Oncor Electric Delievery	X	X
Christopher	Baumgartner	We Energies	X	X
Jason	Beaudoin	Weidmann	X	X
DUVIER	BEDOYA	HITACHI ENERGY	X	
Tammy	Behrens	Prolec GE	X	
Mats	Bernesjo	Hitachi Energy	X	
ALES	BERTUZZI	Georg North America	X	
Jean-Noel	Berube	Rugged Monitoring Quebec Inc	X	X
EDWIN	BETANCOURT	SIEMENS ENERGY	X	X
Vivek	Bhatt	Prolec GE - Waukesha	X	X
Piotr	Blaszczyk	Specialty Transformer Components LLC.	X	X
David	Blew	DS Blew Consulting	X	X
Sanket	Bolar	Oncor Electric Delivery	X	X
Dominique	Bolliger	HV TECHNOLOGIES, Inc.	X	
Susan	Bonfiglio	Western Area Power Administration		X
Mike	Bonn	Soltex	X	
Christopher	Borck	Eaton	X	
Jeremiah	Bradshaw	Bureau of Reclamation	X	X
Lorin	Bratu	Trench limited	X	
Elizabeth	Bray	Southern Company	X	
Jeffrey	Britton	Phenix Technologies Division of Doble Engineering Company	X	X
Samuel	Brodeur	Hitachi Energy		X
Christopher	Brown	San Diego Gas And Electric	X	
Jorge	Cantu de Leon	Alliant Energy	X	
Deniss	Carr	GE		X
JUAN ALFREDO	CARRIZALES	PROLEC	X	X
Camilo	Casallas	Siemens Energy Canada	X	X
Edward	Casserly	Ergon, Inc	X	
Fidel	Castro	San Diego Gas & Electric	X	
Arup	Chakraborty	DELTA STAR INC	X	X

Stuart	Chambers	Powertech Labs	X	
Vivian	Chan	Hitachi Energy	X	X
Matthew	Chisholm	IFD Technologies	X	
Paul	Chisholm	IFD Technologies	X	
Eunyoung	Cho	HICO America Sales & Technology, Inc.	X	
Jaroslav	Chorzepa	US ABB	X	X
Alex	Cochran	United Standard Electric		X
Anthony	Coker	M&I Materials	X	
William	Coughlan	Metglas Inc.	X	
Michael	Craven	Qualus Power Services	X	X
Daniel	Crockett	Ameren	X	
JUAN	CRUZ VALDES	PROLEC GE INTERNACIONAL	X	X
Roberto Ignacio	Da Silva	Cargill	X	
Samson	Debass	EPRI	X	X
Craig	DeRouen	ERMCO	X	
Antonio	Di Biase	Tempel	X	
Nikolaus	Dillon	Dominion Energy	X	X
Paul	Dolloff	East Kentucky Power	X	
Jeffrey	Door	The H-J Family of Companies	X	
Luis Fernando	Duarte-Garcia	EPRI	X	
Jesse	Duffy	Nashville Electric Service	X	X
Salih	Durmus	Siemens Energy	X	
Samraghi	Dutta Roy	Siemens Energy Inc.	X	X
William	Elliott	AEP SWEPCO	X	X
Qusai	Elnimri	Vantran Industries	X	
Marco	Espindola	Hitachi Energy	X	X
Joseph	Faherty	OTC Services		X
Mark	Faulkner	Eaton	X	
Florin	Faur	Prolec GE Waukesha	X	X
Reto	Fausch	RF Solutions	X	
ESSEDDIK	FERDJALLAH KHERKHACHI	Trench France	X	X
Sanford	Fong	Georgia Power	X	
Raymond	Frazier III	Ameren	X	X
Richard	Frye	Eaton	X	
Renjie	Fu	ERMCO/VnF TRANSFORMER	X	
Jose	Gamboa	The H-J Family of Companies	X	X
Miguel	Garcia	Hitachi Energy USA Inc.	X	X
Benjamin	Garcia	Southern California Edison	X	
Michael	Gonzales	Southern California Edison	X	
Luis	Gonzalez	Conduct Industries	X	
Alireza	Gorzin	Black & Veatch	X	X
Jeffrey	Gragert	Xcel Energy	X	
Detlev	Gross	Power Diagnostix Consult GmbH	X	
Ismail	Guner	Hydro-Quebec	X	
Ravi	Gupta	Megger	X	
Niklas	Gustavsson	Hitachi Energy	X	
Michael	Hall	Mid-Central Electric	X	
Corey	Hanson	Advanced Power Technologies	X	
Robert	Harper	Soltex Inc.	X	
Kyle	Heiden	Eaton Corporation	X	X
Carlos	Hernandez	Delta Star Inc		X
Sergio	Hernandez	Hammond Power Solutions	X	X

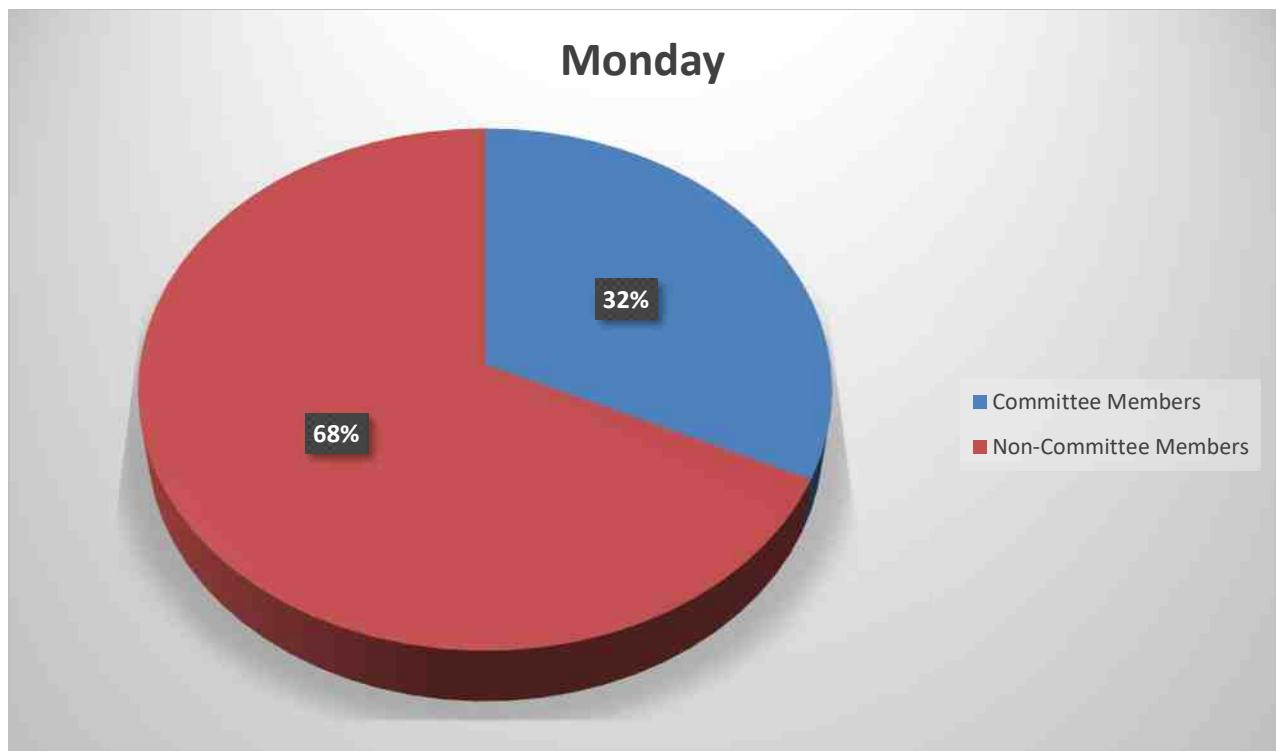
Giovanni	Hernandez Decanini	Virginia Transformers	X	
Jean	Hernandez-Mejia	Georgia Tech NEETRAC	X	X
Saramma	Hoffman	PPL	X	X
Ryan	Hogg	Bureau of Reclamation	X	X
Derek	Hollrah	Burns & McDonnell	X	X
Traci	Hopkins	H2scan Corporation	X	X
Saif	Hossain	Trench Limited - Siemens Energy	X	X
Ramadan	Issack	AEP	X	
Lidija	Ivanic	Koncar Power Transformers Ltd.	X	
Nathan	Jacob	Camlin Energy	X	
Patrycja	Jarosz	IEEE	X	
Nick	Jensen	Delta Star	X	
Christopher	Johnson	Oncor	X	X
Kevin	Juchem	Hitachi Energy Germany AG	X	
Sergiusz	Kapka	Hitachi Energy Poland	X	
THRINADHA	KATAPALLI	VIRGINIA TRANSFORMER CORP	X	
Jerzy	Kazmierczak	Hitachi Energy	X	
Christoph	Kerschenbauer	Siemens Energy	X	
Stacey	Kessler	Ulteig Engineers	X	X
qasim	khan	NEETRAC-Georgia Tech	X	X
Kenneth	Klein	Johnson Electric Coil	X	X
Dmitry	Klempner	Southern California Edison	X	X
William	Knapek	OMICRON	X	
Evan	Knapp	Eaton	x	X
Ivan	Konta	KONČAR-Instrument transformers	X	
ANTON	KOSHEL	Delta Star Inc.		X
Rafal	Kowalski	Hitachi Energy	X	
Gilbert	Kozer	Northeast Transformer Services, LLC	X	
Patrick	Kozer	Northeast Transformer Services	X	
Jusuf	Krvavac	Sargent & Lundy	X	X
Bernard	Labean	Consumers Energy Company	X	X
Mark	Lachman	Doble Engineering	X	
Jason	Lambert	JST Power Equipment	X	
Junho	Lee	Hyundai Electric & Energy Systems	X	
Soyoung	Lee	Hyundai Electric	X	
Moonhee	Lee	Hammond Power Solutions, Inc.	X	
Angela	Leigl	Eaton Corporation	X	
Lance	Lewand	DOBLE ENGINEERING	X	
Chao	Li	Eaton Power System Division	X	
Parry	Lively	Tempel	X	
Mario	Locarno	Doble Engineering	X	
Tiffany	Lucas	ProlecGE	X	X
JOSE	MACHAIN	PROLEC GE	X	X
Alejandro	Macias	CenterPoint Energy	X	
Kushal	Mahajan	EATON	X	
Gabriel	Mamede	Siemens Energy	X	
Bryan	Marquardt	Cleveland-Cliffs	X	
Robert	Mayer	Siemens Energy Austria GmbH	X	
Kevin	Mazzei	Black & Veatch	X	
James	Mcbride	JMX Services, Inc.	X	
Brian	McBride	Cargill	X	X
Toni	Mellin	Vaisala Oyj	X	
OMAR	MENDEZ ZAMORA	PROLEC GE	X	

Timothy	Menter	Lincoln Electric System	X	
Aaron	Meyers	Eaton	X	
Robert	Middleton	RHM International	X	
Francis	Mills	POWER Engineers Inc.	X	X
Goran	Milojevic	DV Power Inc.	X	
Justin	Minikel	Eaton	X	
Marian	Mohamed	Xcel Energy	X	
Juliano	Montanha	Siemens-Energy	X	X
Yuri	Monteiro Rossini	Siemens Energy	X	X
Rhea	Montpool	Schneider Electric	X	
Emilio	Morales-Cruz	Qualitrol	X	X
ANDRE	MORENO	Siemens Energy	X	
Michael	Morgan	Duke Energy	X	
Marta	Munoz	Hitachi Energy Spain S.A.U.	X	
Martin	Munoz Molina	ORTO DE MEXICO SA DE CV	X	
HUGO	MURILLO AREAS	The H-J Family of Companies	X	X
Ismael	Naja	EATON	X	X
Anthony	Natale	HICO America	X	X
Mark	Newbill	Hitachi Energy	X	X
Joe	Nims	Allen & Hoshall	X	
Tommy	Nunn	JST Power Equipment	X	
Shawn	Nunn	Hitachi Energy	X	
stephen	oakes	WEG	X	X
Anastasia	O'Malley	Consolidated Edison Co. of NY	X	X
Edward	Orozco	GE Grid Solutions	X	X
Parminder	Panesar	Virginia Transformer Corp.	X	
Michael	Pappas	Roehling Industrial	X	
George	Partyka	PTI Transformers	X	
Monil	Patel	Pacific Gas and Electric Company	X	X
Dipakkumar	Patel	ITEC	X	
Rakesh	Patel	Hitachi Energy		X
Vinay	Patel	Con Ed	X	
Harry	Pepe	Phenix Technologies	X	X
Igor	Persinec	Koncar Power Transformers Ltd.	X	
Caroline	Peterson	Xcel Energy	X	
sylvain	plante	Hydro-Québec	X	X
Miguel	Plascencia	Pacific Gas & Electric	X	
Goran	Plisic	Koncar Power Transformers Ltd.	X	
Damian	Podgorski	Sargent & Lundy	X	
Homero	Portillo	Advanced Power Technologies	X	
DANIEL	POSADAS	PROLEC SA DE CV	X	X
Chris	Powell	Intermountain Electronics	X	X
Jarrold	Prince	ERMCO	X	
John	Pruente	Prolec GE Waukesha	X	X
Ion	Radu	Hitachi Energy	X	X
Adnan	Rashid	Measurement Canada	X	X
Robert	Reepe	Georgia Power Company	X	
Sebastian	Rehkopf	Maschinenfabrik Reinhausen	X	
Clemens	Reiss Iv	Custom Materials	X	X
Michael	Richardson	Ameren	X	X
Kevin	Riordan	WEG Transformers USA	X	X
Patrick	Rock	American Transmission Company	X	X
Timothy	Rocque	Prolec GE Waukesha	X	X
Leopoldo	Rodriguez Berlanga	Transformer Testing Services L	X	

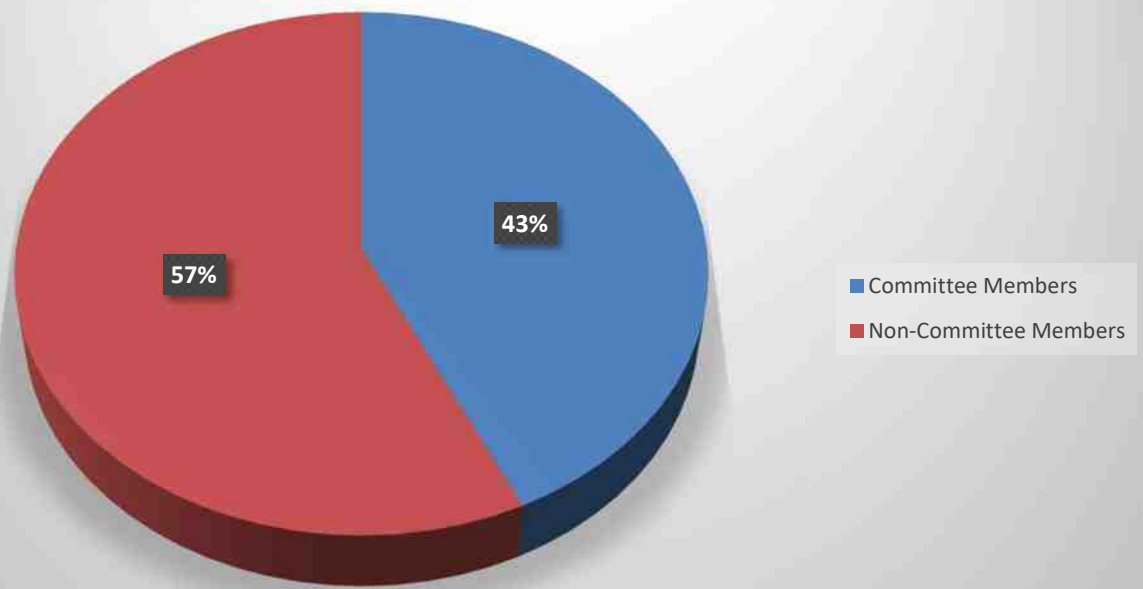
Rodrigo	Ronchi	WEG Transformadores Mexico	X	X
Mason	Rush	Central Moloney, Inc.	X	
Fernando	Salinas	PowerPartners	X	X
Albert	Sanchez	Knoxville Utilities Board	X	X
Lina	Sandsten	Hitachi Energy	X	
Manish	Saraf	Hammond Power Solutions Inc	X	
Anil	Sawant	VIRGINIA TRANSFORMER	X	
ALAOR	SCARDAZZI	Siemens Energy	X	X
Markus	Schiessl	SGB	X	X
Stefan	Schindler	Maschinenfabrik Reinhausen GmbH	X	
Eric	Schleismann	Southern Company Services	X	X
Alfons	Schrammel	Siemens-Energy	X	X
Daniel	Schwartz	Quality Switch	X	
Russell	Sewell	quality switch inc	X	X
AbdulMajid	Shaikh	Delta Star Inc.	X	X
Salahuddin	Shaikh	HITACHI ENERGY INC.	X	
Jaber	Shalabi	Vantran Industries	X	
Michael	Shannon	Rea Magnet Wire	X	
Avijit	Shingari	PEPCO HOLDINGS	X	X
Ibrahim	Shteyh	Shteyh Transformer Consulting	X	X
Richard	Simonelli	GE Grid Solutions	X	
Andre	Simons	JFE Shoji Canada Inc.	X	
Jonathan	Sinclair	PPL Electric Utilities	X	X
Christopher	Slattery	FirstEnergy	X	X
Jason	Snyder	FirstEnergy	X	
Markus	Soeller	Power Diagnostix Systems GmbH	X	
Muhammad Abdullah	Sohail	Trench Limited	X	
Brian	Sonnenberg	Instrument Transformers LLC	X	
Mauricio	Soto	Hitachi Energy	X	
Brian	Sparling	Dynamic Ratings Inc.	X	X
James	Spaulding	City of Fort Collins	X	
Arthur	Speegle	Entergy	X	
Fabian	Stacy	Hitachi Energy	X	
Bradley	Staley	Leeward Renewable Energy	X	
Greg	Steeves	Baron USA, LLC	X	
Ethan	Steiger	Qualitrol Corp		X
Chris	Steineman	Delta Star Inc.	X	
Andrew	Steineman	Delta Star	X	
Christopher	Sullivan	Westmark Partners	X	
Ali	Syed	ComEd	X	X
Matthew	Sze	OMICRON electronics Canada Corp.	X	
Christopher	Talbert	JST Power Equipment	X	
Erik	Tarango-Blanco	OLSUN ELECTRICS	X	X
Valeriu	Tatu	Powersmiths	X	
Marc	Taylor	JFE Shoji Power Canada Inc.	X	
Samuel	Tekle	WEG TRANSFORMERS USA	X	
Jacob	Thielbar	WAPA		X
Scott	Thomas	Hitachi Energy	X	X
Eduardo	Tolcachir	Tubos Trans Electric S.A.	X	X
Risto	Trifunoski	Trench Group	X	
Reinaldo	Valentin	Duke Energy	X	
Cole	Van Dreeel	American Transmission Company	X	
Cameron	Vant	Prolec-GE Waukesha	X	X
Cody	VanWyck	Commonwealth Associates, Inc.	X	

Jos	Veens	Royal SMIT Transformers B.V.	X	X
Kannan	Veeran	Georgia Transformer	X	
Karsten	Viereck	Maschinenfabrik Reinhausen Germany	X	
Richard	Vongemmingen	Dominion Energy	X	X
Pragnesh	Vyas	Sunbelt Solomon Solutions	x	
Nick	Walder	Eaton	X	
Hugh	Waldrop	MLGW	X	
Shelby	Walters	Howard Industries, Inc.	X	
Evanne	Wang	DuPont	X	X
David	Ward	Instrument Transformer Equipment Corp	X	
Alan	Washburn	Burns & McDonnell		X
Zachery	Weiss	WEG Transformers	X	
Daniel	Weyer	Monolith	X	
Joseph	White	POWER Engineers	X	
William	Whitehead	H2scan	X	X
Christopher	Whitten	Hitachi Energy	X	X
Trenton	Williams	Advanced Power Technologies	X	
Barrett	Wimberly	General Electric	X	
Fei	Yang	Hitachi Energy	X	X
Grace Guang	Yuan	Hitachi Energy Hitachi-ABB	X	X
Joshua	Yun	Virginia Transformer Corp	X	
Malia	Zaman	IEEE	X	
Anand	Zanwar	Siemens Energy	X	X
Michael	Zarnowski	Carte International Inc	X	X

In addition to the above totals, there were 266 guests of various status that attended the Monday 3/20/2023 General Transformers Committee Meeting, and 118 that joined the Thursday 3/23/2022 meeting.



Thursday



Monday Opening Session

3 APPROVAL OF AGENDA AND PREVIOUS MINUTES – ED TENYENHUIS

At 8:00 AM CDT the Chair (Ed teNyenhuis) called the meeting to order. He welcomed everyone to the in-person meeting.

The Chair reviewed the names and affiliations of the officers of the Committee.

The agenda was reviewed. There were no comments on the agenda so it is approved.

The Fall 2022 minutes were posted. The Chair requested any comments or changes. There were no comments so the Fall 2022 minutes were approved as published.

4 CHAIR’S REPORT – ED TENYENHUIS

Chair’s Report and Remarks – Presented at the Monday General Session – Spring 2023

4.1 IEEE PES TECHNICAL COUNCIL

The IEEE Power Energy Society (PES) Technical Council is composed of the Chairs of the PES Technical and Coordinating Committees plus the Chairs of Standing Committees reporting to it. The full organizational structure of the PES can be found on the PES website (<https://www.ieee-pes.org>). 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. The Technical Committees work directly with the IEEE-SA Standards Board and the PES Standards Coordinating Committees for standards relating to their respective technical scopes. For further details on the Statement of Purpose and Scope of Activities for the PES Technical Council please see the following website; 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 reference.

TECHNICAL COUNCIL OFFICERS 2022-2023

Chair.....Hong Chen

Vice Chair.....Diane Watkins

Secretary.....Jim McBride

Past Chair.....Vijay Vittal

TECHNICAL COMMITTEES**Chair**

Analytic Methods for Power Systems Committee	Kwok Cheung
Electric Machinery Committee	Jim Lau
Energy Development and Power Generation Committee	Robert Thornton-Jones
Energy Storage and Stationary Battery Committee	Babu Chalamala
Insulated Conductors Committee	Yingli Wen
Nuclear Power Engineering Committee	John White
Power System Communications and Cybersecurity Committee	Craig Preuss
Power System Dynamic Performance Committee	Leonardo Lima
Power System Instrumentation and Measurements Committee	Ernst Hanique
Power System Operation, Planning and Economics Committee	Jianhui Wang
Power System Relaying and Control Committee	Murty Yalla
Smart Buildings, Loads and Customer Systems	Johanna Mathiue
Substations Committee	Patrick Fitzgerald
Surge Protective Devices Committee	Steven Hensley
Switchgear Committee	Keith Flowers
Transformers Committee	Ed teNyenhuis
Transmission and Distribution Committee	Surya Santoso

COORDINATING COMMITTEES**Chair**

Energy Internet Coordinating Committee	Hongbin Sun
Intelligent Grid and Emerging Technologies Coordinating Committee	Jim Follum
Marine Systems Coordinating Committee	Dwight Alexander
Renewable Systems Integration Coordinating Committee	Yingchen Zhang

STANDING COMMITTEES**Chair**

Awards Committee	Vijay Vittal
Organization & Procedures Committee	Jim McBride
Power and Energy Education Committee.....	Siddharth Suryanarayanan
Standards Coordination Committee.....	Todd Irwin
Technical Sessions Committee	Diane Watkins
Entity Proposal Management Committee.....	Vijay Vittal

4.1.2 PES Technical Council Activities

Upcoming Technical Council meetings include the following:

- July 16-20, 2023, Orlando FL, PES General Meeting
- November 2023 TBD – Technical Council Retreat

4.1.3 memberplanet

IEEE PES awarded a contract in 2021 to *memberplanet* for committee membership management. The new system is delayed and unfortunately will not be ready (again) for our March 2023 meeting. Greg Anderson and Jim McBride are involved in the regular update meetings with the contractor and will help ensure the system will have all the tools needed for our committee. IEEE PES is covering the development cost and will cover the cost of the future annual contract for the *memberplanet* tool (except for pass-through charges for event registration such as credit card transaction fees).

Again, activity leaders are requested to continue to use their own mailing lists and meeting rosters.

All activity leaders - please also send any email bounce backs (or email updates) to Greg Anderson at gwanderson@ieee.org so that he can investigate and update the membership database so it will be current for when *memberplanet* is ready.

4.1.4 Working Group Chair Fundamentals

IEEE PES has implemented a mandatory web training for all working group Chairs to be completed by March 1, 2023 (the deadline was extended). New working group leaders will be notified of this requirement when they are registered in IEEE-SA.

4.2 TRANSFORMERS COMMITTEE ACTIVITIES

4.2.1 Upcoming Subcommittee Leadership Change

The Distribution Subcommittee will have a leadership change effective March 1, 2023. **Ed Smith** completed a 4-year term as Chair and stepped down. **Jerry Murphy** (Reedy Creek Energy Services) is appointed as the new Chair and begins a 3-year term starting March 1, 2023.

The Committee thanks Ed for his dedication and service over the past 4 years and welcomes Jerry to the Administrative Subcommittee with best wishes for success in his new role.

4.2.2 Liaison Representatives - Appointed by Committee Chair

There are 2 changes to the Liaison representatives. Ed Casserly will take over the ASTM D27 liaison position from Tom Prevost. As well, Ed Casserly will also be the liaison for a new liaison position for IEC TC10.

Below is the up-to-date list of Liaison Representatives for the Transformer Committee:

- ASTM D27 – Ed Casserly
- CIGRE – Craig Swinderman
- IEC TC10 – Ed Casserly
- IEC TC14 - Phil Hopkinson
- TPWRD Editorial Board – Xose Lopez-Fernandez
- Standards Coordinating Committee, SCC No. 4 (Electrical Insulation) - Evanne Wang

The committee thanks Tom Prevost for his many years of service as liaison for ASTM D27 and welcome Ed to his new liaison positions.

4.2.3 Entity Proposal Management Committee

The Transformer Committee has a representative on the Entity Proposal Management Committee (EPMC) to review entity proposals and ensure they are directed to the correct technical committee. Jim Graham

has stepped down from this position, and Steve Shull has been appointed as the new representative effective Jan 1, 2023.

The committee thanks Jim for his service in this position as EPMC representative and wishes Steve success in this new role.

4.2.4 Fall 2022 Charlotte Meeting

Our Fall 2022 Transformer Committee meeting was a great success with near full attendance.

This is a reminder to please book your stay at the meeting hotel. The larger hotel room block the committee can commit to causes the meeting room cost to be lower (and thus the meeting registration price to be lower).

4.2.5 Committee Schedule

The location and dates of future committee meetings that are currently planned are as follows:

Fall 2023	Kansas City, MO	October 22–26, 2023
Spring 2024	Vancouver, BC	
Fall 2024	St Louis, MO	
Spring 2025	Denver, CO	March 23-27, 2025

Check the Committee website (www.transformerscommittee.org) regularly for information on upcoming meetings.

4.2.6 WebEx Accounts for Standard Development and Virtual Meeting Notification

To support remote technical meetings the IEEE-SA has made available WebEx accounts for use by volunteers involved in standards development activities. Activity leaders are free to use any other web service available to them, but the IEEE-SA WebEx service is available for those who do not have access to a suitable tool.

Activity leaders are reminded to track attendance at each virtual meeting and to record attendance in the minutes of those meetings just as they would for an in-person meeting. To maintain the openness of our meetings, activity leaders are encouraged to use the Transformers Committee website to post notifications of any meetings that occur outside the spring and fall main meetings, thereby allowing any interested party the opportunity to participate. Website notifications can be made by providing the Committee Webmaster the pertinent meeting information.

4.2.7 Avoiding PAR Extensions

Working Group Chairs should pay close attention to the progress of their documents and to strive to complete their assignment(s) within the standard 4-year life of the PAR. To do so, WG Chairs should be careful to avoid scope creep and plan to complete the substantial work on the document in about 3 years to allow sufficient time for the balloting and comment resolution processes.

4.2.8 Meeting App

We will continue to use the IEEE EventHub App for our meetings.

4.2.9 Association Management System (AMS) Records

Per above, there will not be an AMS tool in place for the Spring 2023 meeting. All activity leaders will need to use the pervious 123Signup downloads to create rosters, email list servers, track membership and record meeting attendance.

These files are confidential and shall be maintained in a manner that protects the privacy of the participant information. Only the activity officers should have these files. If activity download files are needed for reason, Bruce Forsythe can be contacted to provide this.

4.2.10 Officer's Travel for Committee Required Business

There is travel required by the Officers for IEEE PES Technical Committee work. The Officers have discussed and approved that all relevant and reasonable travel costs for extra meetings that Officers are required to attend shall be reimbursable by the Transformers Committee. Below are the scheduled meetings for 2023:

Chair: 2 meetings per year

1. JTCM in January for Technical Council meeting
2. General Meeting in July for Technical Council meeting and O&P Committee
3. Technical Council November Retreat (not included since IEEE PES pays for this trip)

Vice-Chair: 1 meeting in 2023

1. 2023 General Meeting in July for Technical Sessions meeting

Secretary: 1 meeting in 2023

1. GM in July for Technical Sessions meeting for training purposes

Typical business expenses will be covered including air, hotel, meals, mileage, parking, taxi/car, baggage fees, tolls, other. The Treasurer will budget accordingly, for 5-6 meetings per year (and include meeting registration fees, as appropriate).

4.2.11 Website Password Usage

The website password 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 is implemented immediately after each fall meeting with an announcement made to share the new password during the closing session.

4.2.12 IEEE Copyright Policy

<https://standards.ieee.org/ipr/index.html>

The Transformers Committee has an obligation comply with the IEEE Copyright Policy and thereby respect and protect the rights of copyright holders by preventing the inappropriate use of material protected by copyright laws.

Compliance with the Copyright Policy requires a certain amount of due diligence on the part of activity leaders, but it is not a daunting task. To assist activity leaders, a webinar was presented on October 5, 2020, that discussed the application of the Copyright Policy during Transformer Committee standards development processes. The presentation is available on the Committee website for those interested in further information.

4.2.13 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.

4.2.14 Letters of Assurance

A Letter of Assurance (LoA) is a document submitted to IEEE-SA by a patent holder which documents the submitter's position with regards to ownership, enforcement, or licensing of an Essential Patent Claim that may be incorporated into a specific IEEE document. Table 1 lists 19 Letters of Assurance that pertain to our committee as of Feb 6, 2023 – there is no change since the last Chair's report. This listing can be found at <https://standards.ieee.org/about/sasb/patcom/patents/> and by clicking “IEEE C37.30.2™ – N42 (XLSX)”.

Table 1: Letters of Assurance

Std No.	Patent Owner	Contact for License	Patent Serial No. (if indicated)	Letter Date	Licensing Assurance Received	Date record entered or revised (if known)
C37.30.2	Southern Electrical Equipment Company Inc.	Andrew Panto - COO/Director of Engineering 4045 Hargrove Avenue Charlotte NC 28208 tel: +1-704-893-0222 fax: +1-704-893-0223 email: aspanto@seecswitch.com http://www.seecswitch.com	5,560,474 (US)	18 Oct 2011	yes	18 Oct 2011
C37.60	S&C Electric Company	Mark W. Stavnes-Vice President, Fuse Products and Polymer Products Division 6601 N Ridge Blvd Chicago IL 60626 tel: +1-773-338-1000 fax: +1-773-338-6196 email: mstavnes@sandc.com; URL: http://www.sandc.com	not indicated	29 Aug 2008	non-awareness statement	2 Sep 2008
C37.102	Schweitzer Engineering Laboratories, Inc.	Richard Edge - Senior Counsel, Legal, 2350 NE Hopkins Court Pullman WA 99163 tel: +1-509-334-8732 fax: +1-509-339-7460 email: ipmail@selinc.com	9,496,707 (US)	18 Jan 2022	yes	18 Jan 2022
C37.245	Schweitzer Engineering Laboratories, Inc.	Richard Edge, Legal 2350 NE Hopkins Court Pullman WA 99163 tel: +1-509-334-8732 fax: +1-509-339-7460 email: ipmail@selinc.com	7,319,576 (US)	11 Apr 2014	yes	11 Apr 2014
C57.12.200	Megger Sweden AB	Niclas Wetterstrand, Product Management Rinkebyvagen 19, SE-182 36 Danderyd, Sweden tel: +46-706917125 email: niclas.wetterstrand@megger.com URL: www.megger.com	8,428,895 (US)	25 Sep 2019	yes	30 Sep 2019

C57.104	Arizona Public Service Company	John Finn - Director Venture Investment Management, Venture Investments 400 North Fifth Street, Mail Station 8103, Phoenix AZ 85004 tel: +1-602-250-3517 email: john.finn@pinnaclewest.com URL: www.aps.com	not indicated	12 Apr 2019	yes	16 Apr 2019
C57.127	ABB Technology Ltd.	Bjorn Dahlstrand, ABB AB, Legal Affairs and Compliance/IP SE 72178, Vasteras, Sweden tel: +46-21345166 fax: +46-21181386 email: bjorn.dahlstrand@seabb.com	6,340,890 (US)	31 Aug 2005	yes	6 Sep 2005
C57.127	General Electric Technology GmbH	Frank Landgraff-Executive Counsel, GE Power Legal Department 3200 Wildwood Parkway Atlanta GA 30339 tel: +1-678-844-5494 email: frank.landgraff@ge.com; URL: https://www.ge.com/power	7,286,968B2 (US)	14 Aug 2018	yes	16 Aug 2018
C57.139	Maschinenfabrik Reinhausen GMBH	Stefanie Hofmeister-Counsel, Corporate Legal Services Falkensteinstrasse 8 D-93059 Regensburg, Germany tel: +49-(0)-94140906811 fax: +49-(0)-94140904015 email: patents@reinhausen.com	not indicated	13 Jan 2013	yes	16 Jan 2013
C57.143	Roger Fenton	Roger Fenton, Principal Engineer, Fenton Solutions 677 N. Shasta Way Upland CA 91786 tel: +1-909-767-8408 email: roger.a.fenton@gmail.com	15/371,085 (US)	9 Oct 2018	yes	12 Oct 2018
C57.143	Roger Fenton	Roger Fenton, Principal Engineer, Fenton Solutions 677 N. Shasta Way Upland CA 91786 tel: +1-909-767-8408 email: roger.a.fenton@gmail.com	10,145,830 (US), 10,613,066 (US), 10,690,643 (US)	3 Aug 2022	yes	5 Aug 2022
C57.143	IntellPower Pty Ltd	Oleg Roizman - Principal, Innovations & Digital Transformation, 10 Warina Road, Carnegie, Victoria, Australia, tel: +61-408109782, email: oleg.roizman@intellpower.com, URL:www.linkedin.com/in/oleg-roizman-23051960	10,101,313 B2 (US)	13 Nov 2021	yes	15 Nov 2021
C57.147 and C57.155	Cooper Power Systems, LLC	Alan Yerges, Engineering - Power Systems Division IP 11131 Adams Road Franksville WI 53126-0100 tel: +1-262-835-2921 fax: +1-262-835-1515 email: alanpyerges@eaton.com	6,398,986 (US) 6,905,638 (US) 7,651,641 (US)	5 Apr 2017	yes; royalty-free	5 Apr 2017
C57.147 and C57.155	Cooper Power Systems, LLC	Alan Yerges, Engineering - Power Systems Division IP 11131 Adams Road Franksville WI 53126-0100 tel: +1-262-835-2921 fax: +1-262-835-1515 email: alanpyerges@eaton.com	PI 9612097-5	5 Apr 2017	NO	5 Apr 2017
C57.162	IntellPower Pty Ltd	Oleg Roizman - Principal, Innovations & Digital Transformation, 10 Warina Road, Carnegie, Victoria, Australia, tel: +61-408109782, email: oleg.roizman@intellpower.com, URL:www.linkedin.com/in/oleg-roizman-23051960	10,101,313 B2 (US)	13 Nov 2021	yes	15 Nov 2021
C57.163	Advanced Power Technologies, LLC	Gary Hoffman - Managing Member 215 State Road 10 Randolph NJ 07869 tel: +1-973-328-3300 x499 fax: +1-973-328-0666	20130285671 (US)	5 May 2014	yes	5 May 2014

		email: grhoffmann@advpowertech.com URL: www.advpowertech.com				
C57.167	ZTZ Services International	Daniel Berler - CEO, 15371 NE 21st Avenue, Miami FL 33162, tel: +1-612-703-3335, email: berlerdaniel@ztzservices.us, URL: www.ztzservices.us	not indicated	23 Apr 2021	yes	23 Apr 2021
C57.167	Roger Fenton	Roger Fenton, Principal Engineer, Fenton Solutions 677 N. Shasta Way Upland CA 91786 tel: +1-909-767-8408 email: roger.a.fenton@gmail.com	10,145,830 (US), 10,613,066 (US), 10,690,643 (US)	3 Aug 2022	yes	5 Aug 2022

Respectfully submitted,



Ed teNyenhuis
Chair, IEEE PES Transformers Committee
Rev. 0, Feb 6, 2023

5 VICE-CHAIR'S REPORT – DAVID WALLACH

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

5.1 IEEE PES CALENDAR OF RECENT AND UPCOMING EVENTS

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

2023

- IEEE PES Grid Edge Technologies Conference and Exhibition
April 10 - 13, 2023, San Diego, California
- IEEE PES General Meeting
July 16 - 20, 2023, Orlando, Florida

2024

- IEEE PES Transmission & Distribution Conference & Exposition (T&D)
May 6-9, 2024, Anaheim, CA
- IEEE PES General Meeting
July 21-25, 2024, Seattle, WA

5.2 2023 IEEE PES GRID EDGE TECHNOLOGIES CONFERENCE AND EXHIBITION, APRIL 10 - 13, 2023, SAN DIEGO, CA

5.2.1 Conference Theme

The weblink is [IEEE PES Grid Edge Technologies Conference & Exposition \(pes-gridedge.org\)](https://pes-gridedge.org)

The theme of the conference is *Meeting the Energy Needs of a Dynamic World*

5.2.2 Conference Paper Submittals

The paper submission period opened to authors on May 2, 2022 and closed on August 31, 2022. Papers were then distributed to various Technical Committees for peer review based upon the paper content. The Transformer Committee peer review process will end on November 15, 2022. Below is a summary of the pending paper reviews:

Total Submissions 1
Accepted 1
Rejected 0

Below are the conference papers accepted (transaction and conference)

Paper	Title	Type
23GET0050	Effectively Managing Today's Transformer Challenges for Increased Asset Reliability & Sustainability	Conference

5.2.3 Panel Sessions

There are 0 panel sessions proposed for the Transformers Committee activities.

5.2.4 Tutorial Sessions

There are 0 tutorial sessions proposed for the Transformer Committee activities.

5.2.5 Paper Reviewer Recognition

Reviewing conference papers is a valuable service to both the authors and the transformer industry. The efforts spent by those who volunteer their time is an essential part of ensuring the papers that are presented are of the highest quality. The time and effort spent reviewing papers often goes unrecognized. The Transformers Committee offers its thanks and gratitude to the following people who volunteered their time to review one or more of the papers submitted.

Marc Foata
Eduardo Garcia
Akash Joshi

Jack Harley
Vijayan Krishnamurthy
Dan Mulkey

Ryan Musgrove
Pugal Selvaraj
Waldemar Ziomek

5.3 2023 IEEE PES GENERAL MEETING, JULY 16 - 20, 2023, ORLANDO, FLORIDA

5.3.1 Conference Theme

The weblink for the event is [IEEE PES General Meeting 2023](https://www.ieee-pes.org/conferences/2023-general-meeting)

The theme of the conference is *Powering a Sustainable Future in a Changing World*.

5.3.2 Conference Paper Submittals

The paper submission period opened to authors on October 4, 2022, and closed on November 20, 2022. Papers were then distributed to various Technical Committees for peer review based upon the paper content. Below is a summary of the pending paper reviews:

Total Submissions 8
Accepted 6
Rejected 2

Below are the conference papers accepted (transaction and conference)

Paper	Title	Type
23PESGM0688	Optimization of Inspection, Testing and Maintenance (ITM) of Transformers	Conference
23PESGM0872	A Practical Approach for Distribution Transformer Loss of Life Assessment Considering Electric Vehicles Penetration	Conference
23PESGM0907	Double-End SFRA Based Method for Detection of Electrical and Mechanical Faults in Transformer Winding	Conference
23PESGM1137	Electromagnetic Modeling of Transformers in EMT-type Software by a Circuit-Based Method	Transaction
23PESGM1614	Comprehensive G-C Modeling of a Gapless Continuously Variable Series Reactor	Conference
23PESGM1670	Development of Digital Twins for Power Transformers	Conference

5.3.3 Paper Reviewer Recognition

Wallace Binder
Marc Foata
Eduardo Garcia
Shashank Gowda
John Herron
Phil Hopkinson

Ali Naderian Jahromi
Kumar Mani
Poorvi Patel
Bertrand Poulin
Sam Sharpless
Hemchandra Shertukde

Kenneth Skinger
Bruce Webb
Drew Welton
Waldemar Ziomek

Respectfully submitted,

David Wallach
Vice-Chair
February 24, 2023

6 SECRETARY'S REPORT – BILL GRIESACKER

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 [Information](#) | Information | Forms. 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 Fall 2022 Administrative Subcommittee meeting, seven new committee member applications were submitted for consideration. The applications were approved. The new members are listed in the following table.

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Hakim Dulac	Qualitrol	Mike Spurlock WG PC57.143 6 years	Joe Watson PC57.148 5 years	Ryan Musgrove Power Transformers SC 4 years	Producer
Evgenii Ermakov	Hitachi Energy	Poorvi Patel Dielectric Test SC 2.5 years	Kumar Mani PC57.170 1 year	Ulf Radbrant HVDC SC 2 years	Producer
Mickel Saad	Hitachi Energy	David Wallach PC57.91 3 years	Kumar Mani PC57.170 2 years	Samuel Sharpless PC57.162 2 years	Producer
Hakan Sahin	Virginia Transformer Corp.	Ryan Musgrove Power Transformers SC 5 years	Stephen Antosz WG PC57.12.90 5 years	Steve Snyder PC57.12.00 5 years	Producer
Kyle Stechschulte	American Electric Power	Scott Reed WG PC57.93 1 meeting	Mike Spurlock PC57.143 2 years	Ryan Musgrove Power Transformers SC 2 years	Consumer
Kerwin Stretch	Siemens Energy	Robert C. Ballard Dry Type Transformers SC 2.5 years	Aniruddha Narawane PC57.96 2 years	Tim-Felix Mai PC57.12.91 2.5 years	Producer
Janusz Szczechowski	Maschinenfabrik Reinhausen	David Walker PC57.12.91 2 years	Ajith Varghese Dielectric Test SC 3 years	Ali Naderian PC57.113 2 years	Producer

6.1.2 New Member Applications

Six new applications for Committee Membership were received for consideration since the last Administrative Subcommittee 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
Piotr Blaszczyk	Specialty Transformer Components	George Payerle SC STNP 2+ years	Craig Colopy C57.131 8 years	John C57.12.40 ? years	Producer
Mats Bernesjo	Hitachi Energy	Rogério Verdolin SC Performance Characteristics 2.3 years	Steve Antosz PC.57.136 Sound Guide 4 years	Dan Blaydon PC57.163 GIC Guide 7 years	Producer
William Elliott	Crescent Power Systems	George Payerle SC STNP 2 years	Ben Garcia WG C57.12.24 2 years	David Blew WG C57.12.40 2 years	Consumer
Goran Milojevic	DV Power	Dan Sauer SC Standards 2 years	Poorvi Patel SC Dielectric Test 2 years	Marcos Ferreira WG C57.152 3 years	Producer
Rhea Montpool	Schneider Electric	Casey Ballard SC Dry Type Transformers 5.5 years	David Walker WG C57.12.91 6 years	Philip Hopkinson TF DOE Efficiency 8 years	Producer
Juan Carlos Cruz Valdez	Prolec-GE	Ryan Musgrove SC Power Transformers 2 years	Eric Weatherbee SC Bushings 1 year	Peter Zhao C57.19.00 3 years	Producer

6.1.3 Association Management System (AMS) Database

The Transformers Committee AMS database of people, as of 12/31/2021, had three general categories of participation in our activities. These were: **Interested Individual**, **Active Participant**, and **Committee Member**. In addition, the Committee Secretary maintains a list of **Past Committee Members**. The AMS 123 system has been disabled and a new system is under development; more information regarding this new system will be provided as it becomes available.

The following comments are based on the AMS 123 system and will be updated once the new system is functional. A new participant will automatically be assigned the role of Interested Individual when they first sign up. It is the responsibility of everyone to keep his/her profile updated (except for the participant status), although the new memberplanet system is presently under development and is not yet accessible. Based on the level of participation, the committee administrative staff will upgrade the participation status to "Active Participant" when appropriate.

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). Note that since AMS is inactive and the memberplanet membership system is under development, only the Committee Member section of the table has been updated.

Note that the Total Committee Members category was corrected since it previously was a sum of the Committee Member, Committee Member - Emeritus, and Committee Member-IEEE Life Member categories. Any individual may be member grade of IEEE Life Member, it is a separate category. The Committee Member category was corrected in the table to the sum of Committee Member and Committee Member - Emeritus categories.

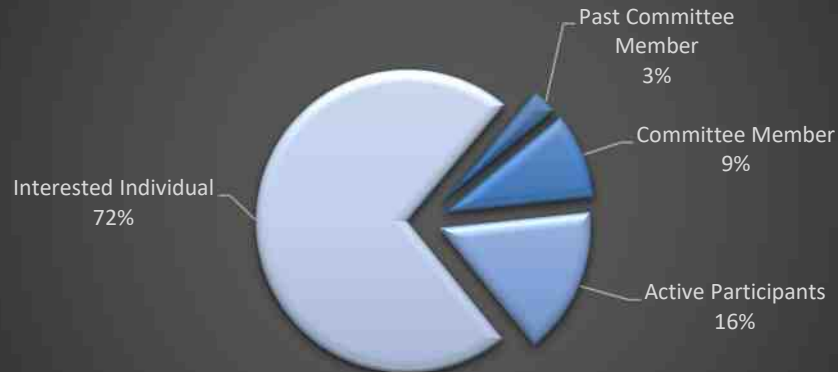
Membership Status	F17	S18	F18	S19	F19	S20	F20	S21	F21*	S22**	F22+	S23+
Interested Individual	1550	1552	1551	1582	1632	1579	1563	1611	1581	1596	1596	1596
<i>Interested Individual - IEEE Life Member</i>	11	13	12	12	12	11	12	12	12	12	12	12
Total Interested Individuals	1561	1565	1563	1594	1644	1590	1575	1623	1593	1608	1608	1608
Active Participant	302	321	324	349	362	365	362	360	350	348	348	348
<i>Active Participant - IEEE Life Member</i>	5	5	5	6	7	6	6	6	6	6	6	6
Total Active Participants	307	326	329	355	369	371	368	366	356	354	354	354
Committee Member	169	175	181	191	182	179	179	173	175	173	183	196
<i>Committee Member – Emeritus</i>	9	10	10	10	10	11	11	11	12	12	13	12
<i>Committee Member - IEEE Life Member</i>	28	33	33	33	32	33	33	32	33	35	29	22
Total Committee Members	178	185	191	201	192	190	190	184	187	185	196	208
Past Committee Member	42	38	38	38	50	48	48	59	56	53	53	53
<i>Past Committee Member - IEEE Life Member</i>	7	6	6	6	8	12	10	12	12	12	12	12
Total Past Committee Members	49	44	44	44	58	60	58	71	68	65	65	65
TOTAL IN AMS DATABASE	2123	2151	2160	2227	2295	2244	2224	2276	2237	2247	2252	2257

* F21 data as of October 3, 2021

**S22 data as of December 31, 2021

* F22 and S23 - only Committee Member section updated due to inactive AMS and memberplanet system not yet available.

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 new memberplanet system, when available, will be most likely be the primary repository for membership records. 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 is used to update participants' 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 Standards Association (IEEE/SA).

6.4 COMMITTEE MEMBERSHIP MAINTENANCE

The last membership audit was performed prior to the October 2022 Transformers Committee Meeting. 9 members had lapsed membership in either IEEE, IEEE-PES, IEEE-SA, or all three. All were notified and given the opportunity to respond. Several added missing memberships to maintain their Committee membership and several declined, for example some had retired and chose not to continue with IEEE memberships. Those who did not respond or chose not to continue with the required memberships were moved to Past Committee Member status. The following individuals did not maintain the required memberships and were converted from Committee Member to Past Committee Member on March 18, 2023:

1. Monty Goulkhah
2. Raja Kuppuswamy
3. Phillip McClure
4. Susan McNelly
5. Brian Penny

6. Edgar Trummer

A review of member attendance for 3 of 5 of the last General Session meetings per the P&P manual resulted in the following 15 members being converted to Past Committee Member status on March 18, 2023 due to attendance shortfalls.

1. Richard Amos
2. William Bartley
3. David Brender
4. Arup Chakraborty
5. Muhammad Ali Masood Cheema
6. Bill Chiu
7. John Crotty
8. James Fairris
9. Robert Ganser
10. Larry Lowdermilk
11. Charles Patrick McShane
12. Harold Moore
13. Subhas Sarkar
14. Stephen Schroeder
15. Robert Thompson

The next scheduled audit for membership requirements in accordance with the Committee P&P will be in 2024 (IEEE-PES and IEEE-SA). Past Committee Members can be reinstated to Committee Member if their status changes and they are able to regularly participate within two years of being changed to Past Committee Member.

6.5 SENIOR MEMBERSHIP REMINDER

IEEE members are encouraged to apply for senior membership. Senior membership gains recognition by peers/management and better positions for fellow membership. The requirements are 10 years of experience and 3 references.

More details and application can be found at <https://www.ieee.org/membership/senior/> or under the “information tab” of the Transformers Committee website.

6.6 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 Claims at the beginning of each meeting and to record the results in the meeting minutes.

6.7 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."

6.8 MEETING MINUTES

The minutes of the Fall 2022 meeting have been posted to the committee website. Thank you to those who submitted their minutes in a prompt fashion.

Subcommittee Chairs are asked to submit their respective subcommittee meeting minutes for the Spring 2023 meeting held in Milwaukee, WI to the Committee Secretary no later than **May 5, 2023**, 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, Bill Griesacker [bgriesacker@verizon.net], 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 like this document. The minutes shall record the essential business of each SC, WG, and TF meeting including:

- a) Name of group
- b) Date and location of meeting
- c) Officer presiding, including the name of the secretary who wrote the minutes
- d) Meeting participants, including affiliation, and voting member status at the end of the meeting
- e) Call to order, Chair's remarks
- f) Reminders of IEEE policies, such as Patent policy and Copyright policy
- g) The fact that a Call for Patents occurred, and any responses made to such Call
- h) Approval of minutes of previous meeting
- i) Approval of agenda
- j) Technical topics
 - 1) Brief summary of discussion and conclusions
 - 2) Motions exactly as they are stated, including the names of mover and seconder and the outcome of each motion
- k) Action items
- l) Items reported out of executive session
- m) Recesses and time of final adjournment

n) Next meeting - date, time, and location

Respectfully submitted,

Bill Griesacker
Secretary
IEEE/PES Transformers Committee
March 18, 2023

7 TREASURER'S REPORT – TROY TANAKA

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

The Treasurer's Report is included as **Appendix 11**.

8 STANDARDS REPORT – STEVE SHULL

The Standard Report was presented at the Monday General Session.

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

9 LIAISON REPORTS

9.1 CIGRE – CRAIG SWINDERMAN

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

9.2 IEC TC-10 – ED CASSERLY

Ed Casserly presented a report on IEC TC10 Fluids for Electrotechnical Applications which is given in Appendix 4.

9.3 IEC TC-14 – CHRISTOPH PLOETNER

Christoph Ploetner provided a presentation on TC14 activities. His presentation is available in **Appendix 5**.

9.4 STANDARDS COORDINATING COMMITTEE NO. 4 (ELECTRICAL INSULATION) – EVANNE WANG– UPDATE BY BRUCE FORSYTH

Evanne Wang presented an update on SCC04. The presentation is available in **Appendix 6**.

9.5 ASTM – ED CASSERLY

Ed Casserly presented an overview of ASTM D27 activities for electrical insulating liquids and gasses. His presentation is available in **Appendix 7**.

9.6 TRANSACTIONS POWER DELIVERY (XOSE LOPEZ-FERNANDEZ)

Xose Lopez-Fernandez prepared an overview of Transaction Power Delivery activities. His presentation is available in **Appendix 8**.

9.7 HOT TOPICS FOR THE UPCOMING WEEK

The Subcommittee Chairs provided hot topics for the work ahead this week week.

9.7.1 Bushings Subcommittee, Eric Weatherbee

PC19.100 should go to ballot by the end of the year.

PC19.02, a new standard, just passed ballot.

9.7.2 Dielectric Test Subcommittee, Poorvi Patel

Some groups have been balloting for a long time and are at the end of a second extension. C57.160 has been in ballot for 3 years. Effort is now being given to help move these BRGs to resolve comments.

C57.117 expired in 2020, balloting on this document closes on March 22, 2023.

Two standards are expiring by 2028 and so work will be started to create PARs.

9.7.3 Distribution Transformers Subcommittee, Josh Verdell for Ed Smith

A new secretary was appointed.

Several standards will expire in 2028 so work will be initiated to create PARs.

C57.12.39 – a chair has been appointed.

C57.15 – Dan Sauer has been appointed chair.

C57.167 – went out to ballot and are working on resolving comments.

9.7.4 Dry Type Subcommittee, Casey Ballard

C57.124 is late and has had two par extensions. The chair is aware and is working to move ahead. In hind sight, the PD detection guide should be a separate document.

9.7.5 HVDC Subcommittee, Ulf Radbrandt

An entity working group is active working on a vibration test for direct-current converter transformers.

Chris Ploetner is working on a dual logo transformer document, will start revision work to apply for a PAR in the fall.

9.7.6 Instrument Transformers, Thomas Sizemore

C57.13 has several new proposals to address combination transformers CT/VT and how to handle non-standard CTs. CCVT standard are resolving comments.

9.7.7 Insulating Fluids Subcommittee, Scott Reed

There was a meeting in December to discuss collecting DGA data since four (4) working groups need the information. IEEE will collect the data and make it anonymous. IEEE will store the data. The goal is to have a lifetime database to continue improving guides.

9.7.8 Insulation Life Subcommittee, Jinesh Malde for Sam Sharpless

A new chair is needed for C57.119 since the previous chair retired.

9.7.9 Performance Characteristics Subcommittee, Rogerio Verdolin

Neutral grounding resistors WG needs to find a chair.

9.7.10 Power Transformers Subcommittee, Ryan Musgrove

The subcommittee has 13 ongoing meetings this week. A few standards are behind but all are in motion. A few pars are ready to be submitted and task forces are ready to make recommendation on forming PARs. A lot of working groups are meeting off schedule to get caught up.

PC57.143 is going to ballot and will be setting up a ballot resolution group. A second group will also be going to ballot.

9.7.11 Standards Subcommittee, Dan Sauer

PC57.12.80 got approval in the fall of 2022 from the WG and SC to go to ballot.

9.7.12 Subsurface Transformers and Network Protectors, George Payrle

There are three Working Groups to finish their work in the next year.

9.8 NEW BUSINESS

An item of new business was brought before the committee by a long serving and well published member. It was stated that up until about five (5) years ago this author never had a technical conference paper rejected by IEEE. In the last five (5) years, every paper submitted has been rejected. This is an issue and a complaint was submitted to the editor. It appears that only papers are submitted to professors. Ed teNyenhuus said that he will bring this issue up at Tech Council.

9.9 OPENING SESSION ADJOURNMENT

The meeting adjourned at 9:15 AM.

Thursday Closing Session

10 CHAIR'S REMARKS AND ANNOUNCEMENTS

The Chair called the meeting to order at 11:00 AM.

The Agenda was reviewed and approved on Monday.

The chair recognized that the meeting was productive with meaningful discussions. Those with upcoming actions such as minutes are encouraged to be prompt to help the next level of minutes to be completed on time. It is encouraged to hold virtual meetings between the bi-annual committee meetings to help advance our standards development work.

MemberPlanet profiles:

- Will receive an email to create your membership profiles
- <https://ieeememberplanet.com/v2app/#/member-registration>
- Allowing 1 month to create profiles in MemberPlanet
- Only create ONE profile in MemberPlanet. Even if you are part of multiple committees, you only need to create ONE profile. All of your committees will appear on your dashboard.
- After the one month is up, we will ask that Subcommittee, Task Force, and Working Group Chairs UPLOAD their rosters (names and emails of their members) to MemberPlanet. The MemberPlanet will then MATCH the names (via email) and your individual rosters will be built.
- There will be training resources available
- After we get the above squared away, we will start having the ability to do conference registrations in the system

11 MEETINGS PLANNING SC MINUTES & REPORT – TAMMY BEHRENS

See Appendix 10.

The Meetings Subcommittee is comprised of the following positions

- Presentations & Tutorials: Tom Prevost (tprevost@ieee.org)
- Break Sponsor: Ed Smith (edsmith@ieee.org)
- Website: Kris Zibert & Sue McNelly (tc-webmaster@ieee.org)
- Mobile App: David Wallach
- Meeting Schedule: Jerry Murphy (jerry.murphy@ieee.org)
- New AMS: Greg Anderson & Jim McBride
- Photography: George Payerle

-
- Registration Desk, Etc.

Jennifer Quandel, HPN

Upcoming meetings, for latest information see the Transformers Committee web page:

FALL 2023 — October 22-26

Kansas City, MO USA

Westin Kansas City at Crown Center

The following considerations are taken into account for future meeting sites: local host, consideration of # of attendees, availability of technical tours and activities, restaurants in walking distance, international airport, and affordable (for the market).

12 REPORTS FROM TECHNICAL SUBCOMMITTEES (DECISIONS MADE DURING THE WEEK)

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

12.1 BUSHINGS ERIC WEATHERBEE

- Bushing SubCom Secretary Role – After a 3-year vacancy we have filled this role.
 - Thank you to Durand Stacy of Hitachi Energy
 - Thank you also Sam Debass of EPRI who also volunteered (conceded to Durand)
- C57.19.01 – Approved to form TF for preparation of next revision cycle
- PC57.19.00 – Has been approved, PC57.19.02 – Has passed balloting
- P65700-19-03 – PAR work continues (1st draft target April)
- PC57.19.100 – Draft work continues, will seek PAR extension “just in case”

12.2 DIELECTRIC TESTS POORVI PATEL

- Quorum was reached and business could be conducted
- C57.160 Guide for the Elec. Measurement of PD in HV Bushing and Instrument Transformers etc- Ballot resolution – Par Exp. 2023
- C57.113 Recommend Practice for Partial Discharge Measurement Power - Ballot Invitation closes 23 of March- Par Exp. 2023
- C57.168 Low Frequency Test Guide- Ballot resolution- Par Exp. 2023
- C57.127 Guide for the Detection of Acoustic Emissions from Partial Discharges – initiate TF in Kansas City
- C57.161 Guide for DFR Measurements – initiate TF in Kansas City

12.3 DISTRIBUTION TRANSFORMERS JERRY MURPHY

- C57.12.20 – In ballot comments resolved; going to recirculation
- C57.12.38 – In ballot comment resolution
- C57.12.34 – Published, PAR for Revision approved
- C57.12.28, .29 – In comment resolution; presentation on UV test methods
- C57.12.35 – MEC reviewed & preparing to open ballot, CRG formed

- PC57.167 – Approved ballot & in editorial review for publishing
- TF Tank Touch Temperature – Continued work; NEETRAC presentation
- TF Transformer Efficiency & Loss Evaluation (DOE Activity) – Continued work
- C57.15 – Dan Sauer; Standard expires 2027
- C57.12.36 – Jerry Murphy; Standard expires 2027
- C57.12.39 – Carlos Gaytan; Standard expires 2027

12.4 DRY TYPE TRANSFORMERS CASEY BALLARD

- C57.16 Air Core Reactors – Approved to move to SA ballot by WG and SC
- C57.12.52 Sealed Dry-Type – Recirculation #2 had only 1 comment
- C57.12.01 Dry Type General Requirements – Included storage and re-energization requirements, added items needed to cover Dry-Type Pole-Type transformers
- C57.134 Hottest Spot Determination – First ballot had 94% approval rate with 50 comments. CRG will address comments and start a recirculation
- 259 LV Thermal Aging – PAR will need revision due to scope change including TI
- C57.94 Installation and Maintenance – covered the testing section with small changes
- C57.96 Loading Guide – Reviewed tool that could be shared for calculations
- C57.124 PD Test – Approved to move to SA ballot by WG and SC
- C57.12.91 Test Code– added QA impulse, Refined cold resistance conditions
- C57.12.59 Through Fault Currents – WG Draft 1 created and shared
- SC decided to sponsor the Entity PAR *Guide for Bridge-Arm Reactors for Low-Frequency (20Hz) Power Transmission*. It has a sizeable overlap with IEEE Std C57.16 which is currently in ballot.

12.5 TRANSFORMER AND REACTORS FOR HVDC APPLICATIONS ULF RADBRANDT

- IEC/IEEE 60076-57-129, Dual Logo – HVDC Transformers
 - We will apply for a PAR to start revision together with IEC TC14
 - The corresponding is planned within IEC TC14
 - Waldemar Ziomek is our proposed WG chair
 - Discussion started regarding experience of usage of the standard
- IEEE 1277, Smoothing and Converter Reactors
 - Published 2020, no revision work for some years
 - Klaus Pointner and Alexander Gaun will do a presentation of condition monitoring of Smoothing and Converter Reactors in the Fall 2023 meeting in Kansas City.

- Entity WG, Guide for Vibration Testing of HVDC Transformer (± 160 kV to ± 1100 kV)
 - Nobody from the WG could join this meeting but they are planning to join the next meeting in Kansas City
 - The WG Chair, Dr. Jun Deng, sent a presentation of the work plan and the background research.
 - Dave Caverly, Mike Sharp and Klaus Pointner have joined a meeting with representatives from the IEEE Switchgear Committee to discuss how they are dealing with Entity PARs. A new meeting is planned and discussions if we should adopt to the same process will continue

12.6 INSTRUMENT TRANSFORMERS THOMAS SIZEMORE

- C57.13 – Resolved several comments, issued assignment to deal with issues raised in the meeting and created a subgroup to work on how to handle VT/CT combination units. Online meetings are expected.
- IEC-IEEE 63253-5713-8 – Standard Requirements for Station Service Voltage Transformers. Resolving the last few comments.
- C57.13.9 – Standard for Power-line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers. In comment resolution.
- TF on IT accuracy – Met and continues to develop recommendations for inclusion in the next version of C57.13.
- ITSC – Discussed merging of C57.13.5 into C57.13. A presentation was given concerning low power ITs (sensors).

12.7 INSULATING FLUIDS SCOTT REED

- WG C57.130-Factory Temperature Rise Test DGA.
 - Did not have quorum. The WG is determining what DGA data should be included as part of the Factory Temperature Rise Test. The WG will request factory DGA data for mineral oil, natural and ester fluids that will be submitted directly to IEEE so the information will remain anonymous.
- WG C57.139-LTC DGA Data.
 - A request has been sent out to Utilities to send DGA data directly to IEEE. So far one participant has submitted data to IEEE. Four Task Force groups have been formed to start the guide revision.
- WG C57.146-Silicone DGA.
 - Received 164,000 DGA data results for analysis. Like C57.104, the flowchart has been duplicated and there are also four tables. The data is being analyzed for accuracy and consistency.
- WG C57.155- DGA for Ester Fluids.

- The WG is determining what data should be included as part of the data collection.
- WG C57.166- Consolidation of Insulating Fluids.
 - The Subcommittee voted to submit this guide to SA Ballot so the next step will be to submit the draft to Mandatory Editorial Coordination for review. The goal is to have this out for a vote in June. The WG has already developed a Ballot Resolution Group to resolve comments.
- WG C57.637- Reclamation of Insulating Liquids.
 - The Tasks Force are just about complete with their compilations. The goal is to have a completed revised guide by the Fall 2023 meeting.

12.8 INSULATION LIFE SAM SHARPLESS

- C57.91 Loading Guide – Almost ready for ballot-may need “safety” extension
- C57.100 Thermal Test – Published 2022. No active PAR
- C57.119 Temp Rise Tests – Expires 2928 - study group approved
- C57.154 Hi Temp Guide – Published 2022. No active PAR
- C57.162 Moisture Guide – In Comment Resolution. Photo finish in 2023.
- C57.165 Temp Measurements – In ballot-may need “safety” extension
- C57.169 Max Winding Rise – Complete, will publish in 2023
- IEEE 1276 Hi Temp Materials – Work on amendment is progressing
- C57.12.90 Clause 11 Temp rise tests – Work continues

12.9 PERFORMANCE CHARACTERISTICS ROGERIO VERDOLIN (REPORTED BY SANJIB SOM)

- C57.149 SFRA Guide
 - PAR expires 2024. MEC Complete, Ballot Invitation Complete and Balanced. Created CRG.
- C57.136 Audible Sound Guide
 - Ballot closed Feb 3, 2023. 70 Approve, 1 Disapprove (98% approval rate). Recirc complete with no significant comments. Will be submitted for publication.
- TF PCS Cont. Rev. to Audible Sound C57.12.90
 - Worked on addressing comments from past C57.12.90 ballot.
- TF PCS Cont. Rev. to C57.12.00
 - Still working on tolerances between phases of ratio measurements and aux loss definition Sec 5.9. New business to consider adding limit on DC injection limits and review table 11 in Sec 7.1.2.
- TF Inverter Transf Precaution on Ground Shields

- TF decided should revise C57.159 to include information. Motion passed to create a PAR study group to create a title, scope and purpose for a revision to C57.159.
- TF PCS Cont. Rev. to C57.12.90
 - Reviewed Clause 5.1 “Determination of cold temperature”. Group agreed to continue to review and propose a revision.
- C57.142
 - CRG working on remaining comments. Discussed six comments in the meeting. Have 23 comments and 10 figures remaining to resolve and update.
- C57.32
 - First WG meeting. Task Forces were created to cover each device covered by the standard. Each task force was assigned volunteer officers.
- Unbalanced loading study group will meet next meeting.
- New business:
 - Motion to form a task force to create a PAR to revise C57.158 passed.
 - Motion to form a task force to study the topic of CO2 emissions over the lifetime of a transformer passed.

12.10 POWER TRANSFORMERS RYAN MUSGROVE

- WG C57.131 – 58 ATTENDEES, 24 OF 41 MEMBERS, MADE QUORUM. ADJUSTED DRAFT BASED ON MEC REVIEW, RECEIVED IEC COPYRIGHT APPROVALS. BALLOT POOL CLOSES APRIL 6TH. WILL MEET IN KANSAS CITY FOR FALL 2023 MEETING.
- TF C57.156 – COMPLETED PAR STUDY – MOTION MADE TO PTSC TO CREATE PAR FOR REVISION AND WAS APPROVED UNANIMOUSLY. WILL MEET IN KANSAS CITY FOR FALL 2023 MEETING AS A WG.
- C57.116 – WAS COMPLETED IN 2022 – NO MEETING
- TF IEEE 638 - COMPLETED PAR STUDY – MOTION MADE TO PTSC TO CREATE PAR FOR REVISION AND WAS APPROVED UNANIMOUSLY. WILL MEET IN KANSAS CITY FOR FALL 2023 MEETING AS A WG.
- WG C57.135 – 42 ATTENDEES, 12 OF 18 MEMBERS PRESENT, QUORUM ACHIEVED. WORKING TOWARDS IEC/IEEE DUAL LOGO WITH PLANS TO MEET WITH IEC REMOTELY. MAY REQUIRE PAR REVISION TO ALIGN WITH IEC WORDING. WILL MEET IN KANSAS CITY FOR FALL 2023 MEETING.
- WG C57.143 – IN BALLOT, BALLOT INVITATIONS CLOSE APRIL 17TH – BALLOT RESOLUTION GROUP FORMED, WILL MEET AGAIN IN KANSAS CITY FOR FALL 2023 MEETING
- WG C57.125 – 102 attendees, 21 of 38 members, quorum achieved. Moving forward with target of May 2024 to submit a draft. Will meet again in Kansas City for Fall 2023 Meeting.
- WG C57.170 – 115 attendees, 36 of 50 Members – seeking PAR extension to complete work.
- TF C57.157 – 30 attendees, 11 of 16 members. Quorum achieved. Motion made to subcommittee to create PAR and approved unanimously. Will meet again in Kansas City for Fall 2023 Meeting as WG.

- WG C57.150 – 46 attendees with 18 of 48 members. No Quorum – Document in ballot with hopes of completion by late Summer 2023 for final submittal to RevCOM. Do not plan to meet in Kansas City.
- TF C57.17 – Working on hangups of PAR, completed. 31 participants met with 14 requesting membership, and will be granted if they attend 1st WG meeting in Kansas City. Volunteers were gathered to review document between meetings.
- WG C57.107 – Motion made to subcommittee to go to ballot and approved unanimously. Comment resolution group formed. Will meet again in Kansas City for Fall 2023 Meeting.
- TF C57.93 – 11 of 18 members, quorum achieved, 63 guests. LTC maintenance presentation made, began discussion on Title, Scope, and Purpose mainly focusing on the maintenance aspect of the title. Will meet again in Kansas City for Fall 2023 Meeting.
- Liaison to Entity PAR PC57.93a – testing performed at -15, -25 & -35°C with preliminary conclusions made, expect more detailed update to be provided on testing at next meeting.
- TF C57.153 – 25 attendees with 7 of 9 members – quorum achieved. Motion made to submit PAR for revision and approved unanimously by SC. Plan to meet again in Kansas City for Fall 2023 Meeting as WG.
- Old business
 - Discussed IEEE 693 document from Substation Standards Committee regarding an amendment currently being balloted. The concern being the contents of the ‘amendment’ are not an ‘amendment’ but may drastically be changing the document in a way that affects the design of Power Transformers.
 - Entity PAR on Digital Twin – Brian Sparling entity rep. – PAR wording is in revision and will have more updates to provide in next meeting. Concerns have been made on translation issues during meetings on the entity PARs being sent to IEEE.
- New Business
 - Entity PAR Request “Guide for Power Transformers for Low-Frequency (20Hz) Power Transmission”
 - A motion was made and approved for the PTSC to accept this entity PAR request, but there are concerns that it will cover more than just the PTSC documents. An entity PAR Liason is needed – Contact ryan.musgrove@ieee.org if you are interested.
 - New business requesting a TF for creation of a new IOT document was brought up but there was not enough time to fully discuss – Tabled to be discussed at our next meeting.

12.11 STANDARDS DAN SAUER

- C57.12.00 – Work is proceeding on the next continuous revision
 - Some info has been finalized this week and will be reported at the next meeting
- C59.12.90 – Similar to 12.00, work is proceeding on the next continuous revision

- Some info has been finalized this week and will be reported at the next meeting
- C57.12.80 – Nearly at the ballot stage. A PAR extension request was also approved if needed.
- C57.152 – Work is complete, but some additional work is needed to verify the balloting procedures are met
- C57.163 – In Ballot resolution
- TF IEEE / IEC Cross Reference – This TF was restarted. They are looking for any previous info. If anyone has any earlier records please send to Alan and myself
- TF Reverse Power Flow Effects – New TF much discussion on this topic. Touches many standards. The TF is working on defining what the outputs of the TF will be.

12.12 SUBSURFACE TRANSFORMERS & NETWORK PROTECTORS GEORGE PAYERLE

- C57.12.23 PAR study group will meet F23, submit PAR prior to S24
- C57.12.24 Going out for ballot recirc. and requesting PAR extension.
- C57.12.40 Voted to go to ballot, and created a comment resolution group.
- C57.12.44 Par has been extended to the end of 2023. Formed a comment resolution group
- C57.167 reports to Dist SC
- C57.12.53 discussed stainless grades and cathodic protection.

13 ADDITIONAL REPORT FROM THE STANDARDS COORDINATOR

This report provides an opportunity to present standard development issues from the week. Please see the Standards Coordinator's report for details. No additional report was offered at the spring 2023 meeting.

14 NEW BUSINESS

No new business items were brought up.

15 CLOSING SESSION ADJOURNMENT

The meeting was adjourned at approximately 12 PM.

16 RECOGNITION AND AWARDS REPORT – BRUCE FORSYTH

16.1 GENERAL

The Transformers Committed appreciates the efforts and contributions made by its many members who volunteer their time to advance the work performed by the Committee. To that end, the Committee dedicates time at each of its meetings to recognize noteworthy events and contributions made by members and participants.

16.2 MEMORIAL TRIBUTES

The Transformers Committee has learned of the passing of three past contributors since its last meeting. Each of these individuals played an important part of Committee activities and upholding the high standards expected of the Transformers Committee during the time they participated.

16.2.1 Said Hachichi

Said Hachichi passed away at age 73 on January 13, 2023.



Said became a Committee Member in 2009. He graduated from Laval University and had a long career in the field of power transformers and other electrical equipment, working for Hydro Quebec for over 32 years.

Said was a member of the Distribution Transformers Subcommittee, the Performance Characteristics Subcommittee, and the Subsurface Transformers and Network Protectors Subcommittee. He loved art and culture, traveling, and spending time with his family.

16.2.2 Keith Ellis

Keith Ellis passed away at age 74 on February 13, 2023.



Keith became a Committee Member in 1999.

As a boy, Keith was a Boy Scout who loved spending summers at Philmont Ranch. He loved traveling, both professionally and with his family, and loved taking trips in his RV.

Keith had two superpowers. He was an encyclopedia of knowledge and a jack of all trades. These were indispensable to those around him. He was a jokester and loved to make others laugh. He loved his country, playing golf, watching Star Trek, and racing, but most of all he loved spending time his family. A crowning achievement was the publication of his book “Bushings for Power Transformers. A Handbook for Power Engineers.”

Tribute (Peter Zhao):

“I know Keith was passionate about the bushings, and his contributions to the bushings standards will be remembered.”

16.2.3 Don Ballard



Don Ballard passed away at age 87 on February 21, 2023.

Don started his career as an apprentice engineer at General Electric in 1952. Over his career, Don developed 17 US patents, some with peers. After 47 years of service, Don retired from General Electric.

Don loved gardening, traveling, music, but mostly his family.

More information is available on the Committee's memorial page at (<https://www.transformerscommittee.org/home/memorials/>).

16.3 EMERITUS MEMBERS

The Emeritus Member classification is a non-voting member classification for past voting members who have made longstanding and notable contributions to the Committee demonstrated a high level of participation in the past but for extenuating reasons are no longer able to meet the other membership requirements.

The following is a list of the Committee's current Emeritus Members:

Peter Balma	Thomas Lundquist	Georges Vaillancourt
Richard Dudley	Bipin Patel	Loren Wagenaar
Donald Fallon	Linden Pierce	Kipp Yule
Kenneth Hanus	H. Jin Sim	Norman Haggerty

16.4 NEW COMMITTEE MEMBERS

Applications for voting membership in the Transformers Committee are review and approved by the Administrative Subcommittee.

Successful applicants can demonstrate **active participation** in **at least three Committee activities for at least two years** and are sponsored by at least one Subcommittee Chair (*specific details available at www.transformerscommittee.org*).

The Transformers Committee welcomes the following new Voting Member whose membership application was reviewed and approved by the Administrative Subcommittee at its March 22, 2022 meeting:

<u>Name</u>	<u>Affiliation</u>
Mats Bernsjo	Hitachi Energy
Piotr Blaszczyk	Specialty Transformer Components
William Elliott	Crescent Power Systems
Goran Milojevic	DV Power
Rhea Montpool	Schneider Electric
Juan Carlos Cruz Valdez	Prolec-GE

16.5 GENERAL SERVICE AWARDS

16.5.1 Certificate of Appreciation – Meeting Host

The Transformers Committee thanks **Waukesha** for serving as the Host Company for the Spring 2023 meeting. In addition, the Committee thanks **Tammy Behrens** and **Dharam Vir** for their dedicated service as Co-Hosts for the meeting.

16.5.2 Certificate of Appreciation – Outgoing Subcommittee Chair

The Transformers Committee offers thanks to **Ed Smith** for completing a 4-year term as Distribution Transformers Subcommittee Chair.

16.5.3 Certificate of Appreciation – Outgoing ASTM D27 Liaison

The Transformers Committee offers thanks to **Tom Prevost** for serving as the Committee's liaison to ASTM D27.

16.6 OUTSTANDING SERVICE AWARDS

The Transformers Committee has been fortunate over the years to have had many people willing to volunteer their time to help advance the Committee's work. At any given time, there are typically dozens of active working groups and task forces. It is through the dedicated efforts of the many volunteers that participate in these activities that the Committee is able to produce and maintain over 100 very important industry standards and guides.

The Transformers Committee is pleased to present an Outstanding Service Award to **George Frimpong** and **Aleksandr (Sasha) Levin**.

16.7 WORKING GROUP AWARDS

The IEEE Standards Association Standards Board (SASB) presents awards to Working Group Chairs upon publication of a new or revised document and offers the Working Group Chair the opportunity to nominate significant contributors for an IEEE SASB Certificate of Appreciation. At this meeting 3 Working Groups were recognized.

16.7.1 IEEE Std C57.12.200™-2022 – *IEEE Guide for the Dielectric Frequency Response Measurement of Bushings*

Entity Working Group Chair: Jun Deng

Transformers Committee Representative: Poorvi Patel

Entity Members:

Peter Werelius	Diego Robalino	Mario Locarno
Ronald Hernandez	Mickel Saad	Ismail Guner
Charles Sweetser	Evgenii Ermakov	Peter Zhao
Ewald Schweiger		

16.7.2 IEEE Std C57.100™-2022 – *IEEE Standard Test Procedure for the Thermal Evaluation of Insulation Systems for Liquid-Immersed Distribution, Power and Regulating Transformers*

WG Chair: Roger Wicks

Vice Chair: Kevin Biggie

Certificates of Appreciation:

Stuart Chambers
Sasha Levin

George Frimpong
Jinesh Malde

Saramma Hoffman
Alan Sbravati

16.7.3 IEEE Std C57.116™-2022 – IEEE Guide for Transformers Directly Connected to Generators

WG Chair: Weijun Li
Vice Chair: Jason Varnell
Secretary: Bill Griesacker

Certificates of Appreciation:

Shankar Nambi
Kayland Adams
Kipp Yule

Toby Johnson
Joe Watson

Ryan Hogg
John K John

16.8 PRESENTATION SLIDES

A brief summary of this Recognition and Awards report was presented at the March 19, 2023 Administrative Subcommittee meeting. A full presentation was made at the Spring 2023 Awards Luncheon on March 21, 2023 in PowerPoint format. The PowerPoint slides are available on the Committee's website at <https://www.transformerscommittee.org/meetings/lastmeetingminutes/>.

Respectfully submitted,



Bruce Forsyth
Awards Chair and Past Chair

IEEE PES Transformers Committee
Rev. 0, April 18, 2023

17 ADMINISTRATIVE SUBCOMMITTEE – ED TENYENHUIS

The Administrative Subcommittee met on March 19, 2023. The following are the unapproved minutes of that meeting.

17.1 INTRODUCTION OF MEMBERS AND GUESTS

The Chair called the meeting to order and attendees introduced themselves by name, affiliation and role in the Administration Subcommittee. Guests also introduced themselves, by giving their name and affiliation.

Members and Guests Present:

Chair Ed teNyenhuis

Vice-Chair	David Wallach
Secretary	Bill Griesacker
Treasurer	Troy Tanaka
Standards Coordinator	Steve Shull
Awards/Past Chair	Bruce Forsyth
Bushings	Eric Weatherbee
Dielectric Tests	Poorvi Patel
Distribution Transformers	Jerry Murphy
Dry Type Transformers	Casey Ballard
Instrument Transformers.....	Thomas Sizemore
Insulation Life	Sam Sharpless
Performance Characteristics	Sanjib Som*
Power Transformers	Ryan Musgrove
Standards	Dan Sauer
Underground Transformers & Network Protectors	George Payerle
Meetings	**

Guests: Malia Zaman, Patricia Jarosz

*Sanjib Som, Vice Chair of Performance Characteristics SC attended meeting for Rogerio Verdolin, Chair.

** Tammy Behrens had schedule conflict and was not able to attend, Meeting Planning SC information to be delivered at main Committee meeting in Monday general session.

17.2 APPROVAL OF PREVIOUS MEETING MINUTES

The Chair requested if there were comments on the draft Fall 2022 Administrative Subcommittee meeting minutes. Dan Sauer made a motion to approve the minutes and Jerry Murphy seconded the motion. Objections to unanimous approval of the minutes was requested. No comments were offered and no objections were voiced, therefore the Fall 2022 Administrative Subcommittee minutes were approved by unanimous consent.

17.3 ADDITIONS TO AND/OR APPROVAL OF THE AGENDA

The preliminary agenda was previously distributed in advance of the meeting. Steve Shull made a motion to approve the agenda and Scott Reed seconded the motion. There were no objections to unanimous approval of the agenda, therefore the following agenda was approved.

	TOPIC	PRESENTER	EST. START
1.	Administrative Topics (:15)	Ed teNyenhuis	 2:00
	1.1. Introductions and Attendance		
	1.2. Affiliation Change Updates		
	1.3. Review and Approval of the Agenda		
	1.4. Approval of Fall 2022 Minutes		
2.	Officer Reports		2:15
	2.1. Chair's Report (:15).....	Ed teNyenhuis	

2.2.	Vice Chair's Report (:05)	David Wallach	
2.3.	Secretary's Report & New Committee Membership Approval (:10)	Bill Griesacker	
2.4.	Treasurer's Report (:05)	Troy Tanaka	
2.5.	Recognition & Awards Report (:05)	Bruce Forsyth	
2.6.	Standards Coordinator's Report (:10)	Steve Shull	
	2.6.1. Standards Report		
	2.6.2. Entity Proposal Report		
3.	IEEE Report		3:05
3.1.	IEEE Staff Update (:10)	Malia Zaman	
4.	Meeting Planning Report		3:15
4.1.	Meeting Planning Report (:05)	Tammy Behrens	
5.	Subcommittee Reports (<i>please limit your report to 4 minutes or less</i>)		3:20
5.1.	Bushings	Eric Weatherbee	
5.2.	Dielectric Test	Poorvi Patel	
5.3.	Distribution Transformers	Jerry Murphy	
5.4.	Dry Type Transformers	Casey Ballard	
5.5.	HVDC	Ulf Radbrandt	
5.6.	Instrument Transformers	Thomas Sizemore	
5.7.	Insulating Fluids	Scott Reed	
5.8.	Insulation Life	Sam Sharpless	
5.9.	Performance Characteristics	Rogério Verdolin	
5.10.	Power Transformers	Ryan Musgrove	
5.11.	Standards	Dan Sauer	
5.12.	Subsurface Transformers & Network Protectors	George Payerle	
6.	Unfinished Business		4:10
6.1.	Update on memberplanet (:10)	Ed teNyenhuis	
6.2.	Publication of the Next Digital CD - Update (:05)	Peter Balma	
6.3.	Other (:05)	All	
7.	New Business (:10)		4:40
8.	Wrap Up & Adjournment		4:50
8.1.	Wrap Up & Adjournment (:10)	Ed teNyenhuis	

17.4 CHAIR'S REPORT – ED TENYENHUIS

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

17.5 VICE CHAIR'S REPORT – DAVID WALLACH

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

17.6 SECRETARY'S REPORT – BILL GRIESACKER

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

Dan Sauer made a motion to approve the following six new member applications and it was seconded by Scott Reed, with the consideration that any unverified membership requirements were met:

Piotr Blaszczyk	Specialty Transformer Components
Mats Bernesjo	Hitachi Energy
William Elliott	Crescent Power Systems
Goran Milojevic	DV Power
Rhea Montpool	Schneider Electric
Juan Carlos Cruz Valdez	Prolec-GE

The six new member applications were approved unanimously without opposition.

17.7 TREASURER’S REPORT – TROY TANAKA

Refer to Section 7.0 of the Main Minutes for a complete “Treasurer’s Report.”

17.8 RECOGNITION & AWARDS REPORT – BRUCE FORSYTH

Refer to Section 8.0 of the Main Minutes for a complete “Recognition & Award’s Report.”

17.9 STANDARDS REPORT AND NEW PAR REQUESTS – STEVE SHULL

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

17.10 IEEE STAFF UPDATE – MALIA ZAMAN

Refer to **Appendix 7** of the Main Minutes for the full PowerPoint presentation.

17.11 MEETING PLANNING REPORT – TAMMY BEHRENS

Refer to Appendix 9 of the main Committee minutes for the full Meeting Planning Subcommittee report.

Brief reports were received from all the subcommittee chairs.

17.11.1 Bushings Subcommittee | Eric Weatherbee

PC19.100 should go to ballot by the end of the year.

PC19.02, a new standard, just passed ballot.

17.11.2 Dielectric Test Subcommittee | Poorvi Patel

Some groups have been balloting for a long time and are at the end of a second extension.

C57.160 has been in ballot for 3 years. Effort is now being given to help move these BRGs to resolve comments.

C57.117 expired in 2020, balloting on this document closes on March 22, 2023.

Two standards are expiring by 2028 and so work will be started to create PARs.

17.11.3 Distribution Transformers Subcommittee | Jerry Murphy

A new secretary was appointed.

Several standards will expire in 2028 so work will be initiated to create PARs.

C57.12.39 – a chair has been appointed.

C57.15 – Dan Sauer has been appointed chair.

C57.167 – went out to ballot and are working on resolving comments.

17.11.4 Dry Type Transformers Subcommittee | Casey Ballard

C57.124 is late and has had two par extensions. The chair is aware and is working to move ahead. In hind sight, the PD detection guide should be a separate document.

17.11.5 HVDC Converter Transformers & Reactors Subcommittee | Ulf Radbrandt

An entity working group is active working on a vibration test for direct-current converter transformers.

Chris Ploetner is working on a dual logo transformer document, will start revision work to apply for a PAR in the fall.

17.11.6 Instrument Transformers Subcommittee | Thomas Sizemore

C57.13 has several new proposals to address combination transformers CT/VT and how to handle non-standard CTs. CCVT standard are resolving comments.

17.11.7 Insulating Fluids Subcommittee | Scott Reed

There was a meeting in December to discuss collecting DGA data since four (4) working groups need the information. IEEE will collect the data and make it anonymous. IEEE will store the data. The goal is to have a lifetime database to continue improving guides.

17.11.8 Insulation Life Subcommittee | Jinesh Malde (for Sam Sharpless)

A new chair is needed for C57.119 since the previous chair retired.

17.11.9 Performance Characteristics Subcommittee | Sanjib Som in for Rogerio Verdolin

Neutral grounding resistors WG needs to find a chair.

17.11.10 Power Transformers Subcommittee | Ryan Musgrove

The subcommittee has 13 ongoing meetings this week. A few standards are behind but all are in motion. A few pars are ready to be submitted and task forces are ready to make recommendation on forming PARs. A lot of working groups are meeting off schedule to get caught up.

PC57.143 is going to ballot and will be setting up a ballot resolution group. A second group will also be going to ballot.

17.11.11 Standards Subcommittee | Dan Sauer

PC57.12.80 got approval in the fall of 2022 from the WG and SC to go to ballot.

17.11.12 Subsurface Transformers & Network Protectors Subcommittee | George Payerle

There are three Working Groups to finish their work in the next year.

17.12 UNFINISHED BUSINESS

17.12.1 Update on new memberplanet development: An announcement will be made by the chair on Monday in the General Meeting that memberplanet is ready for members to add their profile. An email will be sent to all on LISTSERV with a link and instructions.

17.12.2 Publication of the Next Digital CD: The discount to those who purchased the standards bundle will be reimbursed shortly.

17.13 NEW BUSINESS

No new business.

17.14 ADJOURNMENT

The items on the agenda were completed and the meeting was adjourned at 4:25 PM.

Respectfully submitted by:

Bill Griesacker,
Secretary, Transformers Committee

March 19, 2023

March 19, 2023 Adcom Meeting Attendance:

Last Name	First Name	Affiliation	Meeting Date 3/19/2023
Ballard	R. Casey	DuPont	X
Forsyth	Bruce	Bruce Forsyth and Associates PLLC	X
Griesacker	Bill	William Griesacker and Associates Inc.	X
Jarosz	Patricia	IEEE	X
Murphy	Jerry	Reedy Creek Energy Services	X
Musgrove	Ryan	Oklahoma Gas & Electric	X
Patel	Poorvi	EPRI	X
Payerle	George	Carte International Inc.	X
Radbrandt	Ulf	Hitachi Energy	X
Reed	Scott	MVA Diagnostics & Services	X
Sauer	Daniel	EATON Corporation	X
Shull	Stephen	BBC Electrical Services, Inc.	X
Sizemore	Thomas	ABB Inc.	X
Som	Sanjib	PTTI	X
Tanaka	Troy	Burns & McDonnell	X
teNyenhuis	Ed	Hitachi Energy	X
Verdolin	Rogerio	Verdolin Solutions Inc.	
Wallach	David	Duke Energy	X
Weatherbee	Eric	PCORE Electric	X
Zaman	Malia	IEEE	X

APPENDIX 1

Meeting Schedule

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
C	Complete
E	Entity

SATURDAY, MARCH 18

No Events Planned

SUNDAY, MARCH 19

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
1:00 PM – 5:30 PM	Meeting Registration				Regency Prefunction (2)
2:00 PM – 5:00 PM	Administrative Subcommittee - Closed meeting, by invitation only	Admin	E. teNyenhuis	–	Milwaukee (2)
2:00 PM – 5:00 PM	NEMA Transformers - Closed meeting, by invitation only	++	J. Stewart	–	Executive AB (2)
6:00 PM – 8:00 PM	Welcome Reception Renew old friendships and form new ones! This reception will be held inside the beautiful Regency Ballroom, so weather will not be an issue. 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.				Regency Ballroom (2)

MONDAY, MARCH 20 Breaks Sponsored by The H-J Family of Companies*

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 5:00 PM	Meeting Registration				Regency Prefunction (2)
7:00 AM – 7:50 AM	Newcomers Orientation - Arrive early, grab breakfast and get a good seat - Newcomers and guests are encouraged to attend		D. Wallach	—	Lakeshore Ballroom (1)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Atrium (2)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Vue (21)
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		E. teNyenhuis	—	Regency Ballroom (2)
9:30 AM – 3:15 PM	Spouses/Companions Tour: Ethnic Milwaukee Food Tour - Advance on-line registration required — space is limited! - Lunch included at the historic On the Clock bar and grill - See website/flyer for details	Tour			
9:15 AM – 9:30 AM	Break (beverages only): The H-J Family of Companies				Atrium (2)
9:30 AM – 10:45 AM	TF IEEE-IEC Cross Reference	Stds	A. Washburn	I	Gilpatrick (1)
9:30 AM – 10:45 AM	WG Guide of FRA for Liquid Filled Transf. C57.149	PCS	C. Sweetser	I	Lakeshore Ballroom (1)
9:30 AM – 10:45 AM	WG Standard Requirements for Tap Changers - C57.131	Power	C. Colopy	I	Milwaukee (2)
9:30 AM – 10:45 AM	WG Std Transf. Terminology C57.12.80	Stds	D. Sauer	I	Executive Ballroom (2)
9:30 AM – 10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	I	Regency B (2)
9:30 AM – 10:45 AM	TF Guide for Tank Rupture Mitigation C57.156	Power	P. Zhao	N	Regency A (2)
10:45 AM – 11:00 AM	Break (beverages only): The H-J Family of Companies				Atrium (2)
11:00 AM – 12:15 PM	WG Overhead Distr. Transf. C57.12.20	Distr	A. Traut	I	Lakeshore Ballroom (1)
11:00 AM – 12:15 PM	WG Loading Guide PC57.91	Ins Life	D. Wallach	I	Executive Ballroom (2)
11:00 AM – 12:15 PM	WG Class 1E Transf.for Nuclear Power Gen Std. 638	Power	C. Swinderman	I	Regency A (2)
11:00 AM – 12:15 PM	WG Guide for Field Testing PC57.152	Stds	M. Ferreira	I	Milwaukee (2)
11:00 AM – 12:15 PM	TF Partial Discharge Tests for Class I Trfs	DiTests	D. Ayers	I	Regency B (2)
11:00 AM – 12:15 PM	WG Guide for DGA in Silicone PC57.146	IF	P. Boman	I	Gilpatrick (1)
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. To listen to the presentation without eating lunch, arrive by 12:30 pm.				Regency CD (2)
1:45 PM – 3:00 PM	WG 1-ph Padmount Dist Transf. C57.12.38	Distr	A. Ghafourian	I	Executive Ballroom (2)
1:45 PM – 3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	I	Milwaukee (2)
1:45 PM – 3:00 PM	WG Guide for Phase Shifting Transf C57.135	Power	E. Schweiger	N	Regency A (2)
1:45 PM – 3:00 PM	WG Sec. Network Protectors C57.12.44	STNP	M. Faulkner	I	Lakeshore Ballroom (1)
1:45 PM – 3:00 PM	TF Audible Sound Revs & WG Sound Guide C57.136 (S. Antosz)	PCS	R. Girgis	I	Regency B (2)
1:45 PM – 3:00 PM	WG App of High-Temp Insulation Matrs IEEE 1276 Annex B	Ins Life	K. Biggie	I	Gilpatrick (1)
3:00 PM – 3:15 PM	Break (beverages and treats): The H-J Family of Companies				Atrium (2)
3:15 PM – 4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	S. Shull	I	Milwaukee (2)
3:15 PM – 4:30 PM	WG Transformer Monitoring C57.143	Power	M. Spurlock	I	Lakeshore Ballroom (1)
3:15 PM – 4:30 PM	WG Transformer Impulse Test Guide PC57.98	DiTests	T. Hochanh	I	Executive Ballroom (2)
3:15 PM – 4:30 PM	TF Test for Eval of Insulation for Dry-Type Transfs IEEE 259	Dry Type	D. Stankes	I	Gilpatrick (1)
3:15 PM – 4:30 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	I	Regency B (2)
3:15 PM – 4:30 PM	WG Bushing Applicat. Guide C57.19.100	Bush	T. Spitzer	I	Regency A (2)
4:30 PM – 4:45 PM	Break (beverages only): The H-J Family of Companies				Atrium (2)
4:45 PM – 6:00 PM	WG Submersible Transf. C57.12.24	STNP	B. Garcia	I	Milwaukee (2)
4:45 PM – 6:00 PM	TF Tank Touch Temperatures	Distr	B. Webb	N	Regency A (2)
4:45 PM – 6:00 PM	WG Failure Investigation & Reporting PC57.125	Power	H. Sahin	N	Regency B (2)
4:45 PM – 6:00 PM	TF Inverter Transf Precautions on Ground Shields C57.159	PCS	P. Hopkinson	N	Executive Ballroom (2)
4:45 PM – 6:00 PM	TF Core Ground & Winding Insul. Resistance - Perf & Int.	DiTests	D. Robalino	N	Gilpatrick (1)
4:45 PM – 6:00 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	U. Radbrandt	-	Lakeshore Ballroom (1)
6:15 PM – 10:00 PM	Technical Tour: Prolec GE Waukesha Advance registration required—space is limited to one bus! Admission confirmed with badge at bus. Start loading bus for Prolec GE Waukesha's power transformer manufacturing facility at the hotel's Martin Luther King Drive entrance at ~6:15 PM and depart at 6:30 PM. Dinner provided on-site at the PGE Waukesha facility. Return at ~10:00 PM. See website/flyer for more information.	Tech Tour			

TUESDAY, MARCH 21 Breaks Sponsored by Central Moloney, Inc.*

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 11:30 AM	Meeting Registration				Regency Prefunction (2)
7:00 AM – 7:50 AM	EL&P Delegation (End-users only please) - Arrive early and grab breakfast from Regency AB		J. Murphy	—	Crystal (2)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Regency CD (2)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Vue (21)
11:00 AM – 2:00 PM	Spouses/Companions Tour: Hands-On Cooking Class - Advance on-line registration required — limited to 20 people! - Held upstairs at the Milwaukee Public Market - See flyer for details	Tour			
8:00 AM – 9:15 AM	TF Guide for Life Tests of Switch Contacts C57.157	Power	A. Sewell	N	Gilpatrick (1)
8:00 AM – 9:15 AM	WG Condition Assessment Guide PC57.170	Power	K. Mani	I	Lakeshore Ballroom (1)
8:00 AM – 9:15 AM	WG Power-Line Carrier Coupling Cap & Volt Transf. C57.13.9	Instr TR	Z. Roman	I	Milwaukee (2)
8:00 AM – 9:15 AM	WG Practice for Install & Operation of Dry Type PC57.94	Dry Type	K. Klein	I	Regency A (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	Regency B (2)
8:00 AM – 9:15 AM	TF on Revision of Impulse Tests C57.12.00 & C57.12.90	DiTests	S. Plante	I	Executive Ballroom (2)
9:15 AM – 9:30 AM	Break (beverages only): Central Moloney, Inc.				Atrium (2)
9:30 AM – 10:45 AM	WG Low Frequency Test Guide PC57.168	DiTests	D. Sauer	I	Lakeshore Ballroom (1)
9:30 AM – 10:45 AM	WG Transportation Issues C57.150	Power	G. Anderson	I	Executive Ballroom (2)
9:30 AM – 10:45 AM	TF Instrument Transf. Accuracy	Instr TR	I. Ziger	I	Gilpatrick (1)
9:30 AM – 10:45 AM	WG Bushings IEC/IEEE 65700.19.03 Dual Logo	Bush	E. Weatherbee	I	Milwaukee (2)
9:30 AM – 10:45 AM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	I	Regency B (2)
9:30 AM – 10:45 AM	WG Guide for DGA Applied to Factory Temp Rise Test C57.130	IF	B. Forsyth	I	Regency A (2)
10:45 AM – 11:00 AM	Break (beverages only): Central Moloney, Inc.				Atrium (2)
11:00 AM – 12:15 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	I	Executive Ballroom (2)
11:00 AM – 12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	J. Vartanian	I	Lakeshore Ballroom (1)
11:00 AM – 12:15 PM	WG Requirements for Instrument Transformers PC57.13	Instr TR	D. Wallace	I	Milwaukee (2)
11:00 AM – 12:15 PM	WG Guide for Loading Dry Type Transformers C57.96	Dry Type	A. Narawane	I	Gilpatrick (1)
11:00 AM – 12:15 PM	TF Standard Requirements for Arc Furnace Transf. C57.17	Power	D. Corsi	N	Regency B (2)
11:00 AM – 12:15 PM	TF Guide for the Reclamation of Mineral Oil C57.637	IF	S. Denzer	N	Regency A (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.				Regency CD (2)
1:45 PM – 3:00 PM	WG Consolidation Insulating Fluid Guides PC57.166	IF	T. Prevost	I	Lakeshore Ballroom (1)
1:45 PM – 3:00 PM	WG Bar Coding for Distr Transf. C57.12.35	Distr	R. Chrysler	I	Executive Ballroom (2)
1:45 PM – 3:00 PM	TF Cont. Revision to Low Frequency Tests C57.12.90	DiTests	A. Varghese	I	Milwaukee (2)
1:45 PM – 3:00 PM	WG Guide for Mitigating Corrosion on Sub Trfs C57.12.53	STNP	W. Elliott	I	Regency A (2)
1:45 PM – 3:00 PM	WG Volts per Hertz C57.107	Power	J. Watson	I	Regency B (2)
1:45 PM – 3:00 PM	OPEN				
3:00 PM – 3:15 PM	Break (beverages and pretzels): Central Moloney, Inc.				Atrium (2)
3:15 PM – 4:30 PM	WG Recommend Practice for Routine Impulse Tests C57.138	DiTests	H. Sahin	N	Milwaukee (2)
3:15 PM – 4:30 PM	TF Guide for Install & Maintenance of Power Trf C57.93	Power	S. Reed	I	Lakeshore Ballroom (1)
3:15 PM – 4:30 PM	WG Dry Type PD Detection PC57.124	Dry Type	T. Prevost	I	Gilpatrick (1)
3:15 PM – 4:30 PM	WG Geomagnetic Disturbances PC57.163	Stds	D. Blaydon	I	Executive Ballroom (2)
3:15 PM – 4:30 PM	TF Continuous Rev Clause 11 Temp Rise Tests C57.12.90	Ins Life	D. Sankarakurup	I	Regency B (2)
3:15 PM – 4:30 PM	WG Guide DGA in Ester-Immersed Transformers PC57.155	IF	A. Sbravati	N	Regency A (2)
4:30 PM – 4:45 PM	Break (beverages only): Central Moloney, Inc.				Atrium (2)
4:45 PM – 6:00 PM	WG Guide for PD Measure HV Bushings & Inst Trf C57.160	DiTests	T. Hochanh	NC	Gilpatrick (1)
4:45 PM – 6:00 PM	TF Reverse Power Flow Effects on Trans	Stds	D. Blaydon	N	Lakeshore Ballroom (2)
4:45 PM – 6:00 PM	WG Guide for DGA in LTCs C57.139	IF	R. Frotscher	I	Milwaukee (2)
4:45 PM – 6:00 PM	WG Neutral Grounding Devices C57.32	PCS	S. Kennedy	N	Executive Ballroom (2)
4:45 PM – 6:00 PM	TF Guide for Paralleling Transformers C57.153	Power	M. Tostrud	N	Regency B (2)
4:45 PM – 6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	N	Regency A (2)
6:15 PM – 10:30 PM	Technical Tour: Eaton Advance registration required—space is limited to two buses! Admission confirmed with badge at bus. Start loading buses for Eaton's Badger Drive facility in Waukesha at the hotel's Martin Luther King Drive entrance at ~6:15 PM and depart promptly at 6:30 PM. Dinner provided on-site at the Eaton facility. Return at ~10:30 PM. See website/flyer for more information.	Tech Tour			

WEDNESDAY, MARCH 22 Breaks Sponsored by Virginia & Georgia Transformer*

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)				Regency CD (2)	
7:00 AM – 8:00 AM	SC Meetings Planning - Arrive early and grab breakfast from Regency AB - All interested individuals welcome	Mtgs	T. Behrens	–	Crystal (2)	
7:00 AM – 8:30 AM	IEC TC-14 Technical Advisory Group - Breakfast Meeting - arrive early - All interested individuals welcome		P. Hopkinson	–	Lakeshore Ballroom (1)	
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Vue (21)	
8:00 AM – 9:15 AM	SC Instrument Transformers	Instr TR	T. Sizemore	–	Executive Ballroom (2)	
8:00 AM – 9:15 AM	SC Insulation Life	Ins Life	S. Sharpless	–	Regency AB (2)	
9:15 AM – 9:30 AM	Break (beverages only): Virginia & Georgia Transformer				Atrium (2)	
9:30 AM – 10:45 AM	SC Distribution Transformers	Distr	E. Smith	–	Executive Ballroom (2)	
9:30 AM – 10:45 AM	SC Bushings	Bush	E. Weatherbee	–	Regency AB (2)	
10:45 AM – 11:00 AM	Break (beverages only): Virginia & Georgia Transformer				Atrium (2)	
11:00 AM – 12:15 PM	SC Submersible Transf. & Network Protectors	STNP	G. Payerle	–	Executive Ballroom (2)	
11:00 AM – 12:15 PM	SC Dielectric Test	DiTests	P. Patel	–	Regency AB (2)	
12:15 PM – 1:30 PM	Lunch Break					
1:30 PM – 2:45 PM	SC Dry Type Transformers	Dry Type	C. Ballard	–	Executive Ballroom (2)	
1:30 PM – 2:45 PM	SC Power Transformers	Power	R. Musgrove	–	Regency AB (2)	
2:45 PM – 3:00 PM	Break (beverages and treats): Virginia & Georgia Transformer				Atrium (2)	
3:00 PM – 4:15 PM	SC Insulating Fluids	IF	S. Reed	–	Executive Ballroom (2)	
3:00 PM – 4:15 PM	SC Performance Characteristics	PCS	R. Verdolin	–	Regency AB (2)	
4:15 PM – 4:30 PM	Break (beverages only): Virginia & Georgia Transformer				Atrium (2)	
4:30 PM – 5:45 PM	SC Standards	Stds	D. Sauer	–	Regency AB (2)	
6:00 PM – 10:00 PM	Harley-Davidson Museum - Advance on-line registration required; admission confirmed with name badge at location - Transportation will be available with first run departing hotel at 5:45 PM and running every 15 minutes until 7:30 PM; first return shuttle departs H-D Museum at 8:30 PM and will run approximately every 15 minutes, with last run at 10:00 PM - Enjoy museum exhibits and gift shop before and/or after dinner at your own pace — with or without headset/audio tour; NO FOOD OR BEVERAGES ARE ALLOWED IN THE MUSEUM - Appetizers, buffet dinner and cash bars (credit cards accepted) in the Rumble Room, which is connected to the museum by an enclosed walkway; see flyer for details	Social				

THURSDAY, MARCH 23

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)				Atrium (2)	
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Vue (21)	
8:00 AM – 9:15 AM	Technical Presentation 1 Tutorial on the DOE NOPR for Distribution Transformers Efficiency Requirements and its Implications by Phil Hopkinson, Colby Lovins, Bryan Marquardt, Aaron Meyers, Dan Mulkey, Joe Tedesco and Alan Traut - See flyer on website for details **	Tutorial			Regency Ballroom (2)	
9:15 AM – 9:30 AM	Break (beverages only)					
9:30 AM – 10:45 AM	Technical Presentation 2 Tutorial on Innovative Solutions to Increase Overload Capability for Oil and Dry-Type Transformer Bushings by Kurt Kaineder, Alfons Schrammel and Essedik Ferdjallah-Kherkhachi - See flyer on website for details **	Tutorial			Regency Ballroom (2)	
10:45 AM – 11:00 AM	Break (beverages only)					
11:00 AM – 12:00 PM	Closing Session - All attendees are encouraged to attend - See separate document on website for meeting agenda		E. teNyenhuis		Regency Ballroom (2)	
12:00 PM	Lunch (on your own)					
12:15 PM – 3:30 PM	Technical Tour: Dynamic Ratings Advance registration required. Space is limited to 25 attendees! Admission confirmed with badge at bus. Start loading bus at ~12:15 PM at the hotel's Martin Luther King Drive entrance and depart promptly at 12:30 PM. Lunch served at the Dynamic Ratings facility upon arrival. Return at ~3:30 PM. See website/flyer for more information.	Tech Tour				

* 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.

FUTURE COMMITTEE MEETINGS

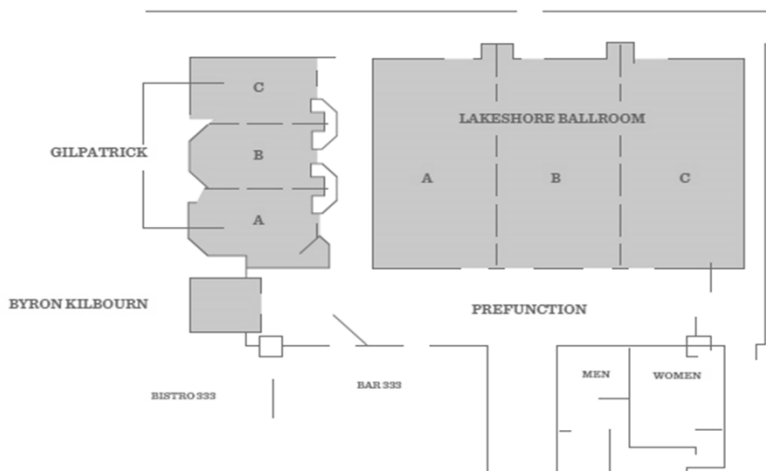
Fall 2023: Kansas City, Missouri USA, October 22 – 26, 2023

Spring 2024: Vancouver, BC Canada, March 10 – 14, 2024

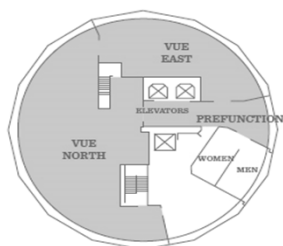
Fall 2024: St. Louis, Missouri, October 27 – 31, 2024

Spring 2025: Denver, Colorado USA, March 23 – 27, 2025

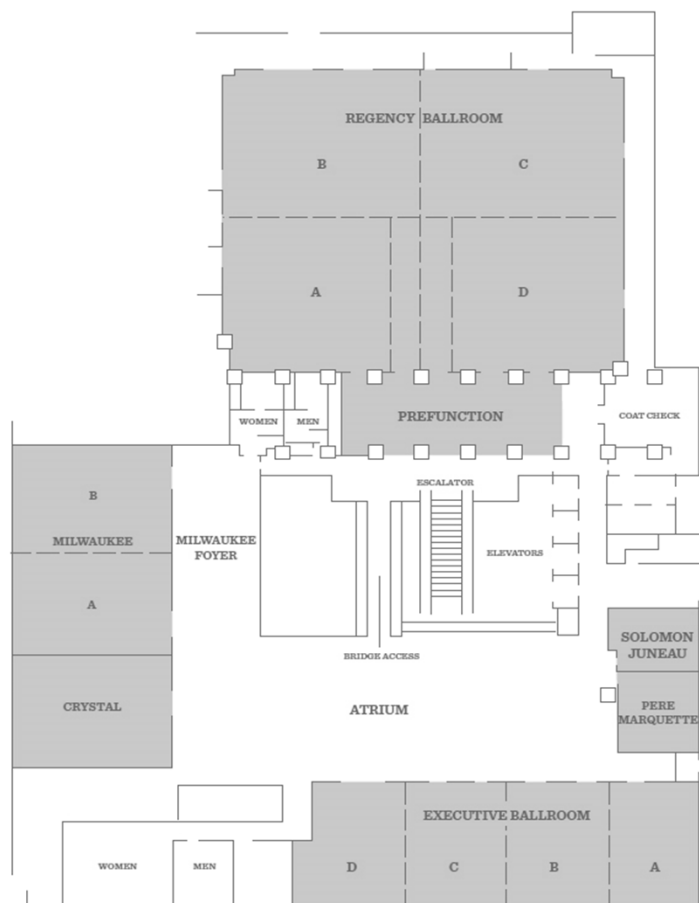
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SUBCOMMITTEE MEETING LIST

SPRING 2023 MEETING: MARCH 19 TO MARCH 23

Hyatt Regency; Milwaukee, WI USA

Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
3/19/2023	2:00 PM	5:00 PM	Administrative Subcommittee - Closed meeting, by invitation only	Admin	E. teNyenhuis	Milwaukee (2)
3/20/2023	3:15 PM	4:30 PM	WG Bushing Applicat. Guide C57.19.100	Bush	T. Spitzer	Regency A (2)
3/21/2023	9:30 AM	10:45 AM	WG Bushings IEC/IEEE 65700.19.03 Dual Logo	Bush	E. Weatherbee	Milwaukee (2)
3/22/2023	9:30 AM	10:45 AM	SC Bushings	Bush	E. Weatherbee	Regency AB (2)
3/20/2023	9:30 AM	10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	Regency B (2)
3/20/2023	11:00 AM	12:15 PM	WG Overhead Distr. Transf. C57.12.20	Distr	A. Traut	Lakeshore Ballroom (1)
3/20/2023	1:45 PM	3:00 PM	WG 1-ph Padmount Dist Transf. C57.12.38	Distr	A. Ghafourian	Executive Ballroom (2)
3/20/2023	3:15 PM	4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	S. Shull	Milwaukee (2)
3/20/2023	4:45 PM	6:00 PM	TF Tank Touch Temperatures	Distr	B. Webb	Regency A (2)
3/21/2023	8:00 AM	9:15 AM	WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32	Distr	D. Mulkey	Regency B (2)
3/21/2023	1:45 PM	3:00 PM	WG Bar Coding for Distr Transf. C57.12.35	Distr	R. Chrysler	Executive Ballroom (2)
3/22/2023	9:30 AM	10:45 AM	SC Distribution Transformers	Distr	E. Smith	Executive Ballroom (2)
3/20/2023	11:00 AM	12:15 PM	TF Partial Discharge Tests for Class I Trfs	DiTests	D. Ayers	Regency B (2)
3/20/2023	3:15 PM	4:30 PM	WG Transformer Impulse Test Guide PC57.98	DiTests	T. Hochanh	Executive Ballroom (2)
3/20/2023	4:45 PM	6:00 PM	TF Core Ground & Winding Insul. Resistance - Perf & Int.	DiTests	D. Robalino	Gilpatrick (1)
3/21/2023	8:00 AM	9:15 AM	TF on Revision of Impulse Tests C57.12.00 & C57.12.90	DiTests	S. Plante	Executive Ballroom (2)
3/21/2023	9:30 AM	10:45 AM	WG Low Frequency Test Guide PC57.168	DiTests	D. Sauer	Lakeshore Ballroom (1)
3/21/2023	1:45 PM	3:00 PM	TF Cont. Revision to Low Frequency Tests C57.12.90	DiTests	A. Varghese	Milwaukee (2)
3/21/2023	3:15 PM	4:30 PM	WG Recommend Practice for Routine Impulse Tests C57.138	DiTests	H. Sahin	Milwaukee (2)
3/21/2023	4:45 PM	6:00 PM	WG Guide for PD Measure HV Bushings & Inst Trf C57.160	DiTests	T. Hochanh	Gilpatrick (1)
3/22/2023	11:00 AM	12:15 PM	SC Dielectric Test	DiTests	P. Patel	Regency AB (2)
3/20/2023	1:45 PM	3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	Milwaukee (2)
3/20/2023	3:15 PM	4:30 PM	TF Test for Eval of Insulation for Dry-Type Transfs IEEE 259	Dry Type	D. Stankes	Gilpatrick (1)
3/21/2023	8:00 AM	9:15 AM	WG Practice for Install & Operation of Dry Type PC57.94	Dry Type	K. Klein	Regency A (2)
3/21/2023	11:00 AM	12:15 PM	WG Guide for Loading Dry Type Transformers C57.96	Dry Type	A. Narawane	Gilpatrick (1)
3/21/2023	3:15 PM	4:30 PM	WG Dry Type PD Detection PC57.124	Dry Type	T. Prevost	Gilpatrick (1)
3/21/2023	4:45 PM	6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	Regency A (2)
3/22/2023	1:30 PM	2:45 PM	SC Dry Type Transformers	Dry Type	C. Ballard	Executive Ballroom (2)
3/20/2023	4:45 PM	6:00 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	U. Radbrandt	Lakeshore Ballroom (1)
3/20/2023	11:00 AM	12:15 PM	WG Guide for DGA in Silicone PC57.146	IF	P. Boman	Gilpatrick (1)
3/21/2023	9:30 AM	10:45 AM	WG Guide for DGA Applied to Factory Temp Rise Test C57.130	IF	B. Forsyth	Regency A (2)
3/21/2023	11:00 AM	12:15 PM	TF Guide for the Reclamation of Mineral Oil C57.637	IF	S. Denzer	Regency A (2)
3/21/2023	1:45 PM	3:00 PM	WG Consolidation Insulating Fluid Guides PC57.166	IF	T. Prevost	Lakeshore Ballroom (1)
3/21/2023	3:15 PM	4:30 PM	WG Guide DGA in Ester-Immersed Transformers PC57.155	IF	A. Sbravati	Regency A (2)
3/21/2023	4:45 PM	6:00 PM	WG Guide for DGA in LTCs C57.139	IF	R. Frotscher	Milwaukee (2)
3/22/2023	3:00 PM	4:15 PM	SC Insulating Fluids	IF	S. Reed	Executive Ballroom (2)
3/20/2023	11:00 AM	12:15 PM	WG Loading Guide PC57.91	Ins Life	D. Wallach	Executive Ballroom (2)
3/20/2023	1:45 PM	3:00 PM	WG App of High-Temp Insulation Mats IEEE 1276 Annex B	Ins Life	K. Biggie	Gilpatrick (1)
3/21/2023	3:15 PM	4:30 PM	TF Continuous Rev Clause 11 Temp Rise Tests C57.12.90	Ins Life	D. Sankarakurup	Regency B (2)
3/22/2023	8:00 AM	9:15 AM	SC Insulation Life	Ins Life	S. Sharpless	Regency AB (2)
3/21/2023	8:00 AM	9:15 AM	WG Power-Line Carrier Coupling Cap & Volt Transf. C57.13.9	Instr TR	Z. Roman	Milwaukee (2)
3/21/2023	9:30 AM	10:45 AM	TF Instrument Transf. Accuracy	Instr TR	I. Ziger	Gilpatrick (1)
3/21/2023	11:00 AM	12:15 PM	WG Requirements for Instrument Transformers PC57.13	Instr TR	D. Wallace	Milwaukee (2)
3/22/2023	8:00 AM	9:15 AM	SC Instrument Transformers	Instr TR	T. Sizemore	Executive Ballroom (2)
3/22/2023	7:00 AM	8:00 AM	SC Meetings Planning - Arrive early and grab breakfast from Regency AB - All interested individuals welcome	Mtgs	T. Behrens	Crystal (2)

SUBCOMMITTEE MEETING LIST

SPRING 2023 MEETING: MARCH 19 TO MARCH 23

Hyatt Regency; Milwaukee, WI USA

Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
3/20/2023	9:30 AM	10:45 AM	WG Guide of FRA for Liquid Filled Transf. C57.149	PCS	C. Sweetser	Lakeshore Ballroom (1)
3/20/2023	1:45 PM	3:00 PM	TF Audible Sound Revs & WG Sound Guide C57.136 (S. Antosz)	PCS	R. Girgis	Regency B (2)
3/20/2023	3:15 PM	4:30 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	Regency B (2)
3/20/2023	4:45 PM	6:00 PM	TF Inverter Transf Precautions on Ground Shields C57.159	PCS	P. Hopkinson	Executive Ballroom (2)
3/21/2023	9:30 AM	10:45 AM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	Regency B (2)
3/21/2023	11:00 AM	12:15 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	Executive Ballroom (2)
3/21/2023	4:45 PM	6:00 PM	WG Neutral Grounding Devices C57.32	PCS	S. Kennedy	Executive Ballroom (2)
3/22/2023	3:00 PM	4:15 PM	SC Performance Characteristics	PCS	R. Verdolin	Regency AB (2)
3/20/2023	9:30 AM	10:45 AM	TF Guide for Tank Rupture Mitigation C57.156	Power	P. Zhao	Regency A (2)
3/20/2023	9:30 AM	10:45 AM	WG Standard Requirements for Tap Changers - C57.131	Power	C. Colopy	Milwaukee (2)
3/20/2023	11:00 AM	12:15 PM	WG Class 1E Transf. for Nuclear Power Gen Std. 638	Power	C. Swinderman	Regency A (2)
3/20/2023	1:45 PM	3:00 PM	WG Guide for Phase Shifting Transf C57.135	Power	E. Schweiger	Regency A (2)
3/20/2023	3:15 PM	4:30 PM	WG Transformer Monitoring C57.143	Power	M. Spurlock	Lakeshore Ballroom (1)
3/20/2023	4:45 PM	6:00 PM	WG Failure Investigation & Reporting PC57.125	Power	H. Sahin	Regency B (2)
3/21/2023	8:00 AM	9:15 AM	TF Guide for Life Tests of Switch Contacts C57.157	Power	A. Sewell	Gilpatrick (1)
3/21/2023	8:00 AM	9:15 AM	WG Condition Assessment Guide PC57.170	Power	K. Mani	Lakeshore Ballroom (1)
3/21/2023	9:30 AM	10:45 AM	WG Transportation Issues C57.150	Power	G. Anderson	Executive Ballroom (2)
3/21/2023	11:00 AM	12:15 PM	TF Standard Requirements for Arc Furnace Transf. C57.17	Power	D. Corsi	Regency B (2)
3/21/2023	1:45 PM	3:00 PM	WG Volts per Hertz C57.107	Power	J. Watson	Regency B (2)
3/21/2023	3:15 PM	4:30 PM	TF Guide for Install & Maintenance of Power Trf C57.93	Power	S. Reed	Lakeshore Ballroom (1)
3/21/2023	4:45 PM	6:00 PM	TF Guide for Paralleling Transformers C57.153	Power	M. Tostrud	Regency B (2)
3/22/2023	1:30 PM	2:45 PM	SC Power Transformers	Power	R. Musgrove	Regency AB (2)
3/20/2023	9:30 AM	10:45 AM	TF IEEE-IEC Cross Reference	Stds	A. Washburn	Gilpatrick (1)
3/20/2023	9:30 AM	10:45 AM	WG Std Transf. Terminology C57.12.80	Stds	D. Sauer	Executive Ballroom (2)
3/20/2023	11:00 AM	12:15 PM	WG Guide for Field Testing PC57.152	Stds	M. Ferreira	Milwaukee (2)
3/21/2023	3:15 PM	4:30 PM	WG Geomagnetic Disturbances PC57.163	Stds	D. Blaydon	Executive Ballroom (2)
3/21/2023	4:45 PM	6:00 PM	TF Reverse Power Flow Effects on Trans	Stds	D. Blaydon	Lakeshore Ballroom (2)
3/22/2023	4:30 PM	5:45 PM	SC Standards	Stds	D. Sauer	Regency AB (2)
3/20/2023	1:45 PM	3:00 PM	WG Sec. Network Protectors C57.12.44	STNP	M. Faulkner	Lakeshore Ballroom (1)
3/20/2023	4:45 PM	6:00 PM	WG Submersible Transf. C57.12.24	STNP	B. Garcia	Milwaukee (2)
3/21/2023	11:00 AM	12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	J. Vartanian	Lakeshore Ballroom (1)
3/21/2023	1:45 PM	3:00 PM	WG Guide for Mitigating Corrosion on Sub Trfs C57.12.53	STNP	W. Elliott	Regency A (2)
3/22/2023	11:00 AM	12:15 PM	SC Submersible Transf. & Network Protectors	STNP	G. Payerle	Executive Ballroom (2)

APPENDIX 2

Semi-Annual Standards Report

IEEE PES Transformers

Chair: Ed teNyenhuis

Vice Chair: David Wallach

Secretary: Bill Griesacker

Treasurer: Troy Tanaka

Past Chair: Bruce Forsyth

Standards Coordinator: Stephen Shull

Administrative
Chair: ED teNyenhuis

Meeting Planning
Chair: Tammy Behrens

Bushings
Chair: Eric Weatherbee
Pg 2

Insulating Fluids
Chair: Scott Reed
Pg 5

Dielectric Tests
Chair: Dr. Poorvi Patel
Pg 2

Insulation Life
Chair: Sam Sharpless
Pg 5

Distribution Transformers
Chair: Jerry Murphy
Pg 3

Performance Characteristics
Chair: Rogerio Verdolin
Pg 6

Dry Type Transformers
Chair: Casey Ballard
Pg 3

Power Transformers
Chair: Ryan Musgrove
Pg 7

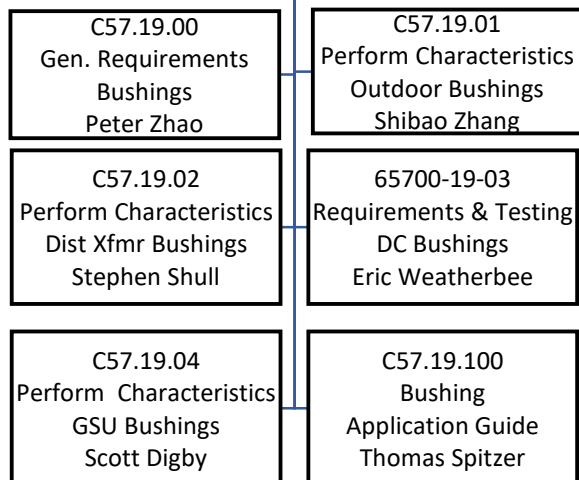
Transformers and Reactors for HVDC
Application
Chair: Ulf Radbrandt
Pg 4

Standards
Chair: Dan Sauer
Pg 8

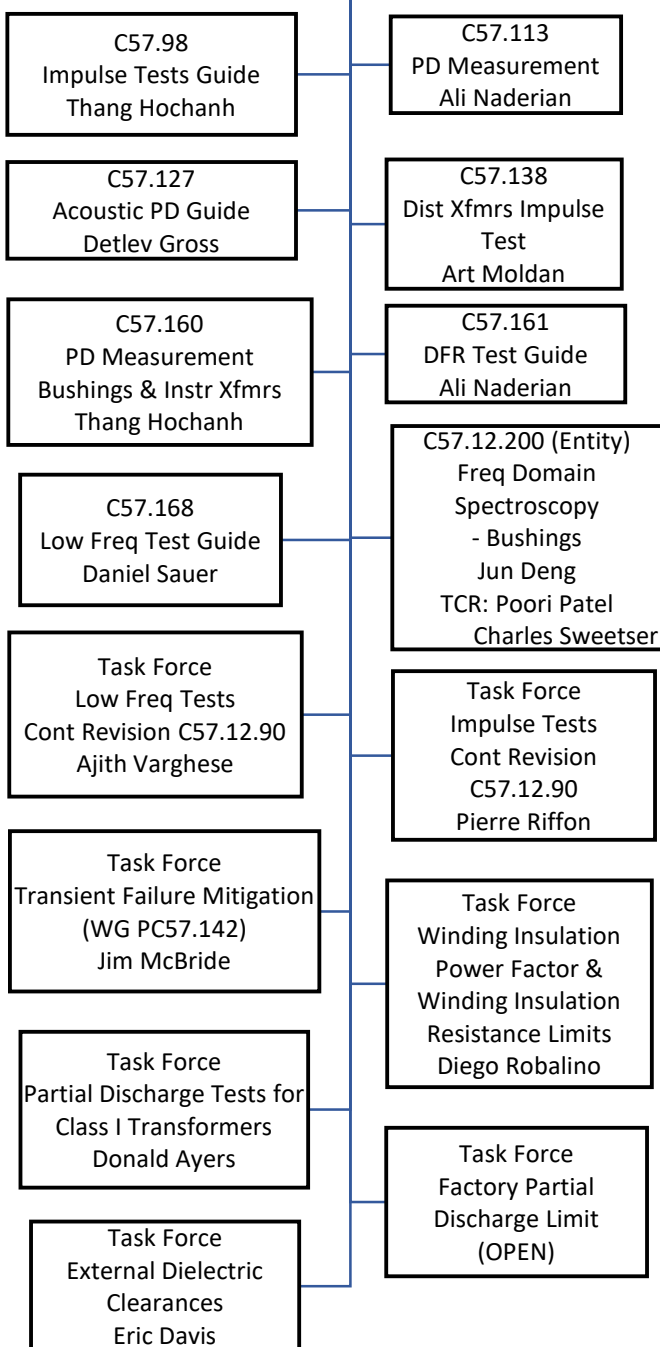
Instrument Transformers
Chair: Thomas Sizemore
Pg 4

Subsurface Transformers
& Network Protectors
Chair: George Payerle
Pg 4

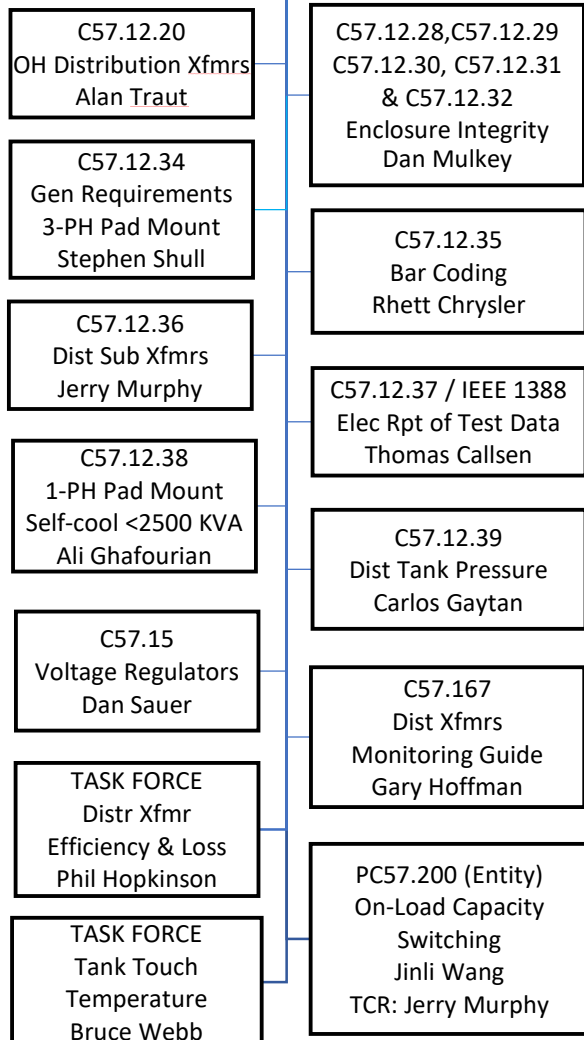
Bushings Chair - Eric Weatherbee



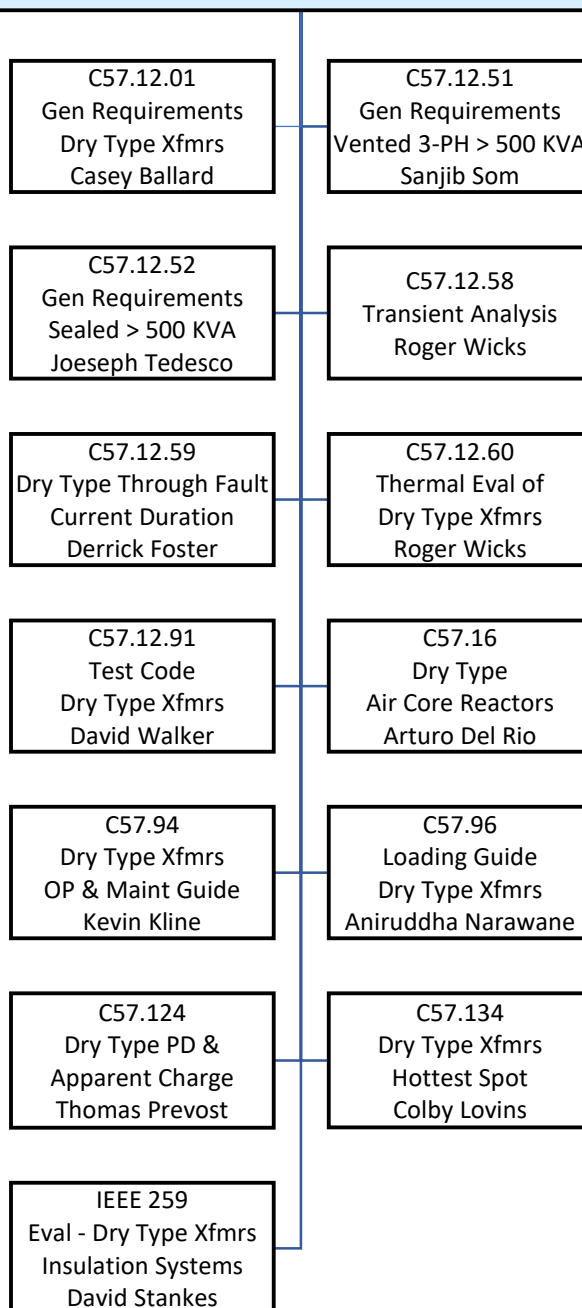
Dielectric Tests Chair - Dr. Poorvi Patel



Distribution Transformers Chair - Jerry Murphy

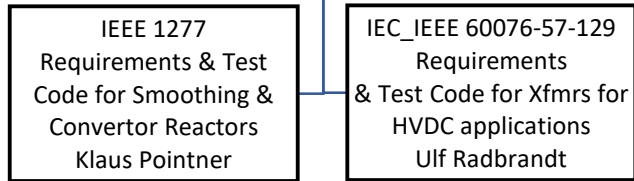


Dry Type Transformers Chair - Casey Ballard



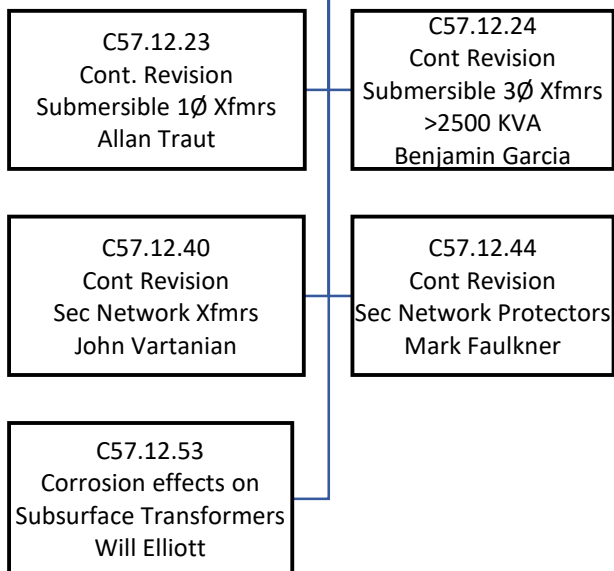
Transformers & Reactors for HVDC Applications

Chair - Ulf Radbrandt



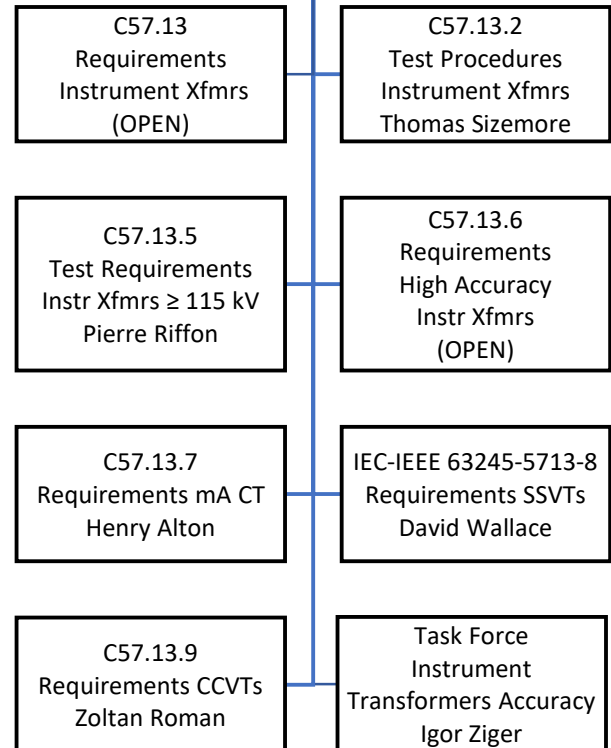
Subsurface Transformers & Network Protectors

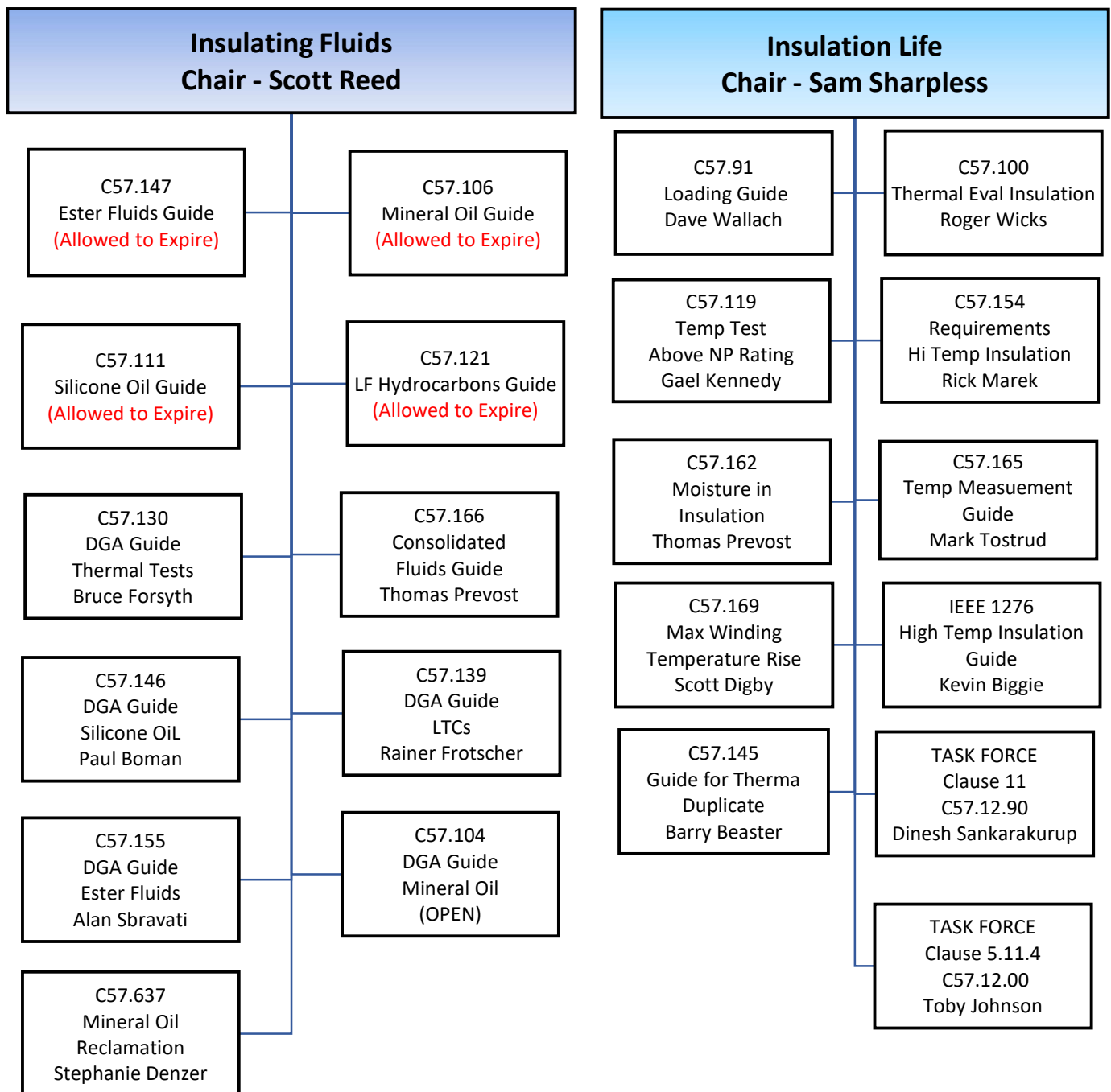
Chair - George Payerle

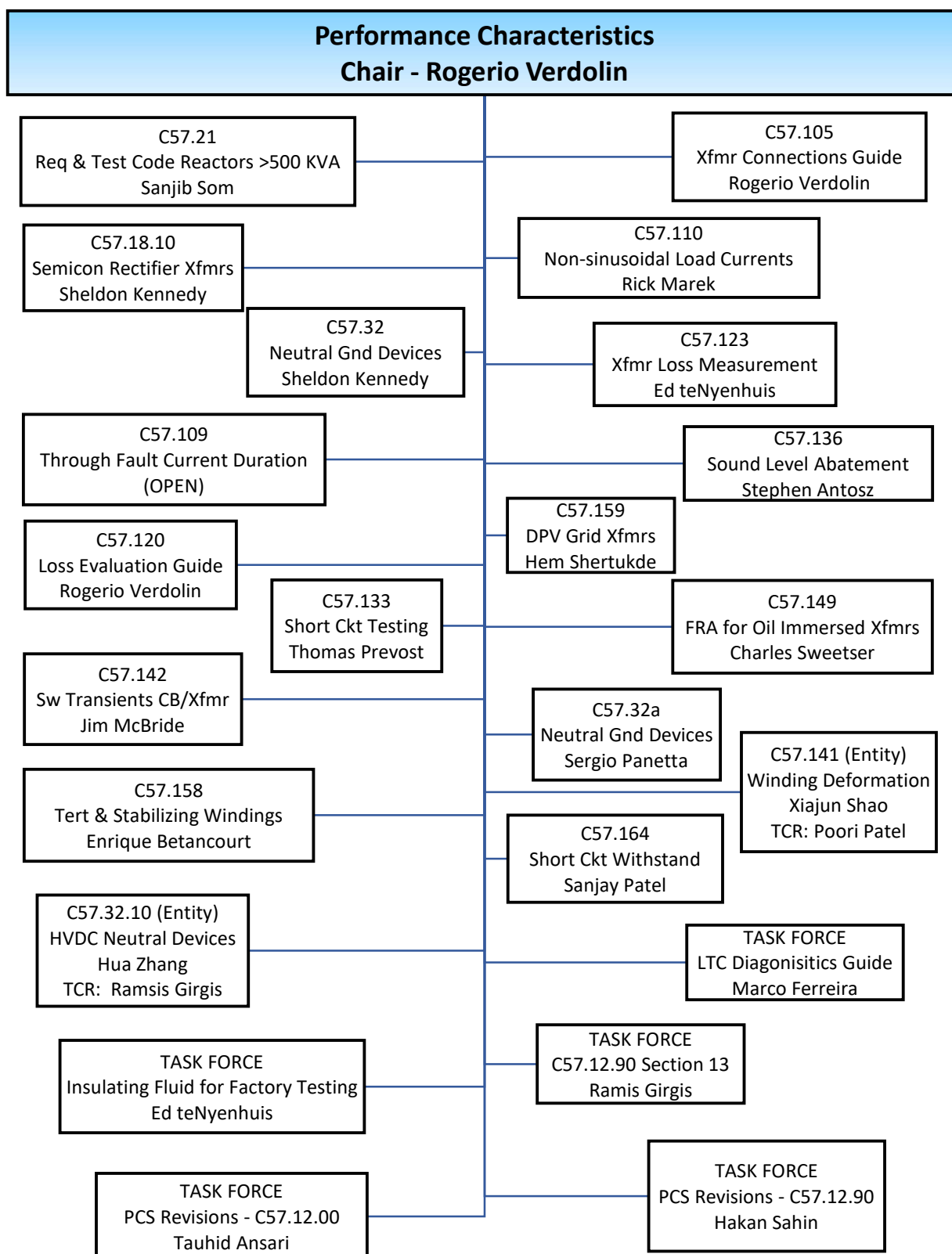


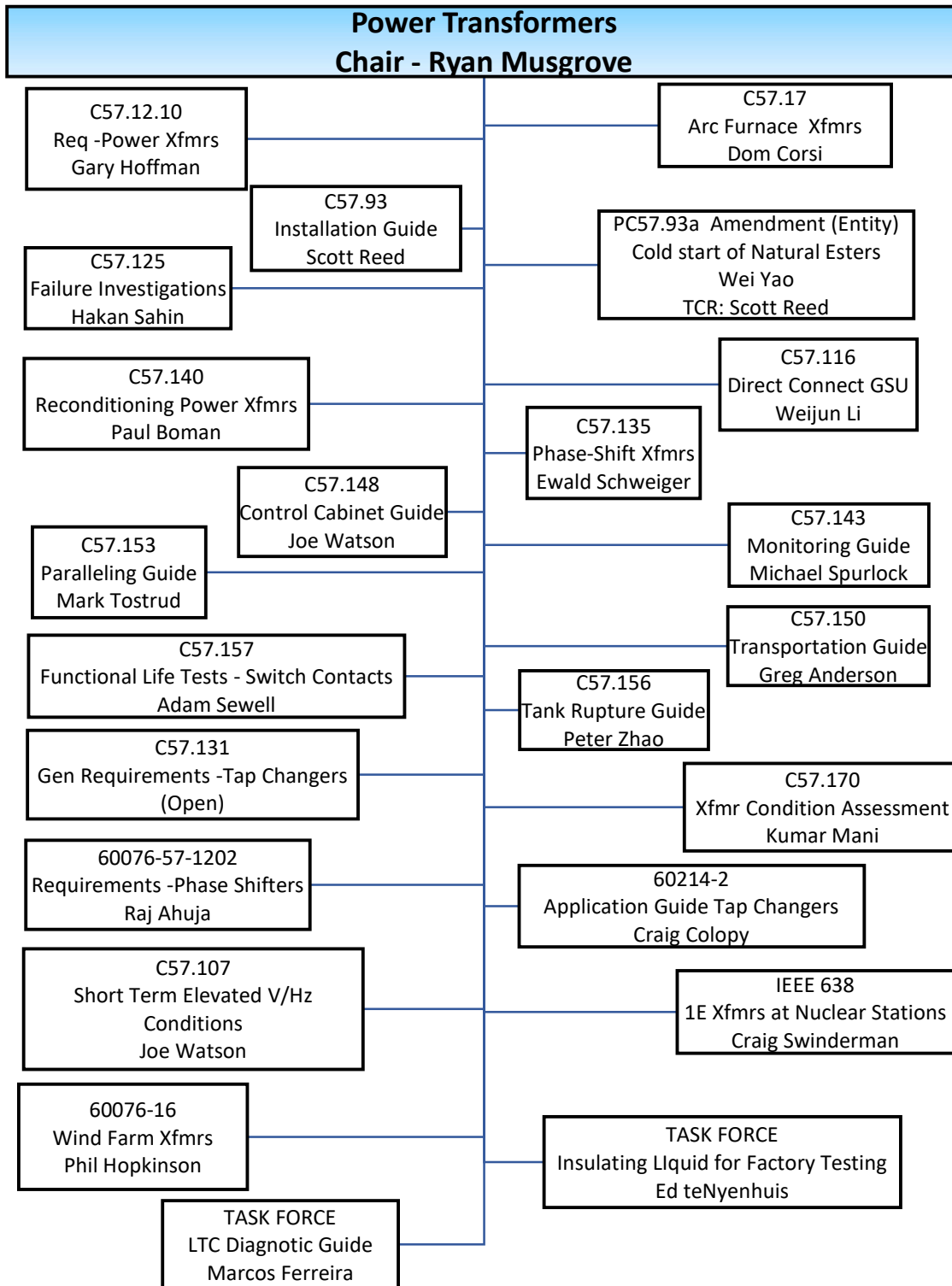
Instrument Transformers

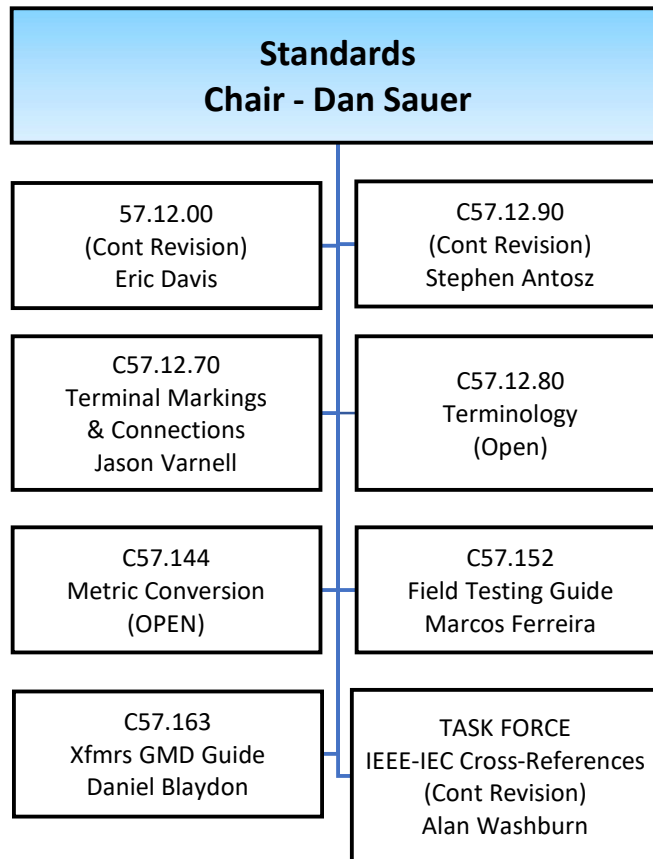
Chair - Thomas Sizemore











IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone		Rev Due Date	Remark
PROJECT		Email		PAR Expiration	
SubCommittee BUSHINGS					
CHAIR: Eric Weatherbee		eweatherbee@hubbell.com		(585) 768 - 1272	
Individual	Draft Standard for Design and Performance Requirements for Bushings Applied to Liquid Immersed Distribution Transformers	Stephen Shull (417) 206 - 4047 sshull@ckt.net		2/5/2016	Active PAR + 2 PAR Extension On RevCom agenda for the May 15, 2023 meeting
PC57.19.02				12/31/2024	
65700-19-03	IEC/IEEE International Standard -- Bushings for DC application	Eric Weatherbee (585) 768 - 1272 eweatherbee@hubbell.com	2014	9/23/2021	ACTIVE + PAR for Revision
Individual				12/31/2024	
P65700-19-03				12/31/2025	
C57.19.00	Standard General Requirements and Test Procedure for Power Apparatus Bushings		2023		ACTIVE
Individual				12/31/2033	
C57.19.01	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings		2017		ACTIVE
Individual				12/31/2027	
C57.19.04	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		2018		ACTIVE
Individual				12/31/2028	
C57.19.100	IEEE Guide for Application of Power Apparatus Bushings	Thomas Spitzer (817) 584 - 6567 t.spitzer@sbcglobal.net	2012	5/21/2019	INACTIVE-RESERVED + PAR for Revision
Individual				12/31/2022	
PC57.19.100				12/31/2023	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee DIELECTRIC TESTS					
CHAIR: Dr. Poorvi Patel		ppatel@epri.com		(704) 232 - 4551	
Individual PC57.160	Guide for the Electrical Measurement of Partial Discharges in High Voltage Bushings and Instrument Transformers	Thang Hochanh (819) 821-3636 thanghochanh@surplec.com		6/15/2017 12/31/2023	Active PAR + 1 PAR Extension SA BALLOT closed 1/9/2019 with 520 comments to resolve. Currently in comment resolution.
Individual PC57.168	Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers	Daniel Sauer (262) 896 - 2417 dmsauer@mtu.edu		6/14/2018 12/31/2023	Active PAR + 1 PAR Extension SA BALLOT closed 2/13/2023 with 287 comments to resolve. Currently in Comment Resolution.
C57.113 Individual PC57.113	IEEE Guide for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors	Ali Naderian (647) 300 - 8836 ali.naderian@ieee.org	2010 12/31/2020	12/6/2017 12/31/2023	INACTIVE-RESERVED + PAR Revision +1 PAR Extension SA BALLOT: Balloting scheduled to close 3/23/2023.
C57.12.200 Entity	Guide for the Frequency Domain Spectroscopy Measurement of Transformer Bushings		2022 12/31/2032		ACTIVE
C57.127 Individual	IEEE Guide for the Detection, Location and Interpretation of Sources of Acoustic Emissions from Electrical Discharges in Power Transformers and Power Reactors		2018 12/31/2028		ACTIVE
C57.138 Individual PC57.138	IEEE Recommended Practice for Routine Impulse Test for Distribution Transformers	Hakan Sahin (208) 220-6963 hakanshaun@gmail.com	2016 12/31/2026	6/16/2022 12/31/2026	ACTIVE + PAR for Revision
C57.161 Individual	IEEE Guide for Dielectric Frequency Response Test		2018 12/31/2028		ACTIVE
C57.98 Individual PC57.98	IEEE Guide for Transformer Impulse Tests	Thang Hochanh (819) 821-3636 thanghochanh@surplec.com	2011 12/31/2021	10/27/2018 12/31/2024	INACTIVE-RESERVED + PAR Revision+ 1PAR Extension

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STANDARD		Working Group Chair		Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone		Rev Due Date		Remark
PROJECT		Email		PAR Expiration		
SubCommittee DISTRIBUTION TRANSFORMERS						
CHAIR: Jerry Murphy		jerry.murphy@ieee.org		(407) 824 - 4194		
Entity	Recommended Practice for On-load Capacity Switching Distribution Transformers	Jinli Wang			2/10/2021	Active PAR
PC57.12.210		 wangjinli@epri.sgcc.com.cn			12/31/2025	TCR: Jerry Murphy
C57.12.20	Standard for Overhead Type Distribution Transformers, 500 kVA and Smaller, High-Voltage 34 500 Volts and Below; Low-Voltage, 7970/13 800 Y Volts and Below	Alan Traut		2017	2/8/2019	ACTIVE + PAR for Revision
Individual		(601) 422 - 1198 atraut@ieee.org		12/31/2027		SA BALLOT closed 2/3/2023 with 48 comments to resolve. Currently in Comment Resolution.
PC57.12.20					12/31/2023	
C57.12.28	Standard for Pad Mounted Equipment - Enclosure Integrity	Daniel Mulkey		2014	3/5/2020	ACTIVE + PAR for Revision
Individual		(707) 776 - 7346 dhmulkey@ieee.org		12/31/2024		SA BALLOT: Balloting invitation to close 3/10/2023. CO-STD-COM – Switchgear
PC57.12.28					12/31/2024	
C57.12.29	Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments	Daniel Mulkey		2014	3/5/2020	ACTIVE + PAR for Revision
Individual		(707) 776 - 7346 dhmulkey@ieee.org		12/31/2024		SA BALLOT: Balloting invitation to close 3/10/2023. CO-STD-COM – Switchgear
PC57.12.29					12/31/2024	
C57.12.30	Std for Pole-Mounted Eqpt - Enclosures for Coastal Environment			2020		ACTIVE
Individual				12/31/2030		CO-STD-COM – Switchgear
C57.12.31	IEEE Standard for Pole Mounted Equipment - Enclosure Integrity			2020		ACTIVE
Individual				12/31/2030		CO-STD-COM – Switchgear
C57.12.32	Standard for Submersible Equipment - Enclosure Integrity			2019		ACTIVE
Individual				12/31/2029		
C57.12.34	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	Stephen Shull		2022	2/15/2023	ACTIVE + PAR for Revision
Individual		(417) 206 - 4047 sshull@ckt.net		12/31/2032		
PC57.12.34					12/31/2027	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee DISTRIBUTION TRANSFORMERS					
CHAIR: Jerry Murphy		jerry.murphy@ieee.org	(407) 824 - 4194		
C57.12.35	IEEE Standard Bar Coding for Distribution Transformers and Step-Voltage Regulators	Rhett Chrysler	2013	6/13/2019	ACTIVE + PAR for Revision
Individual		(731) 288 - 2831	12/31/2023		
PC57.12.35		rhettchrysler@ieee.org		12/31/2023	
C57.12.36	Standard Requirements for Liquid-Immersed Distribution Substation Transformers		2017		ACTIVE
Individual			12/31/2027		
C57.12.37	IEEE Standard for the Electronic Reporting of Transformer Test Data		2015		ACTIVE
Individual			12/31/2025		
C57.12.38	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	Ali Ghafourian	2014	10/28/2017	ACTIVE + PAR for Revision + 1 PAR Extension
Individual		(706) 202 - 7212	12/31/2024		Main Document PAR shown. Corrigenda PAR is currently active until 2024. Corrigenda PAR will be allowed to expire. SA BALLOT: Balloting scheduled to close 3/8/2023.
PC57.12.38		asghar.ghafourian@gmail.com		12/31/2023	
C57.12.39	IEEE Standard for Requirements for Distribution Transformer Tank Pressure Coordination		2017		ACTIVE
Individual			12/31/2027		
C57.15	IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators		2017		ACTIVE
Individual			12/31/2027		
C57.167	Guide for Monitoring Distribution Transformers		2023		ACTIVE
Individual			12/31/2023		

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee DRY TYPE TRANSFORMERS					
CHAIR:	Casey	Ballard			
		robert.c.ballard@ieee.org		(804) 292 - 5207	
259	IEEE Standard Test Procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General-Purpose Transformers	David Stankes (512) 984 - 5026 dsstankes@mmm.com	1999 12/31/2020	12/3/2020 12/31/2024	INACTIVE-RESERVED+ PAR for Revision Standard was allowed to expire by the SC. However, when revising IEEE C57.12.60, the need for this standard was recognized.
Individual					
P259					
C57.12.01	IEEE Standard for General Requirements for Dry-Type Distribution and Power Transformers	Casey Ballard (804) 292 - 5207 robert.c.ballard@ieee.org	2020 12/31/2030	2/23/2022 12/31/2026	ACTIVE + PAR for Revision This standard is under continuous revision.
Individual					
PC57.12.01					
C57.12.51	IEEE Guide for Mechanical Interchangeability of Ventilated Dry-Type Transformers		2019 12/31/2029		ACTIVE
Individual					
C57.12.52	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	Joseph Tedesco (276) 688-1675 joseph.l.tedesco@hitachi-pow	2012 12/31/2022	3/5/2020 12/31/2024	INACTIVE-RESERVED + PAR for Revision (Scope Changed and Approved 2/23/2022) SA BALLOT closed 9/10/2022 with 76 comments to resolve. Currently in Comment Resolution.
Individual					
PC57.12.52					
C57.12.58	IEEE Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil		2017 12/31/2027		ACTIVE
Individual					
C57.12.59	IEEE Guide for Dry-Type Transformer Through-Fault Current Duration	Derek Foster (815) 529 - 1907 drfoster@ieee.org	2015 12/31/2025	6/6/2022 12/31/2026	ACTIVE + PAR for Revision
Individual					
PC59.12.59					
C57.12.60	IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers		2020 12/31/2030		ACTIVE
Individual					
C57.12.91	IEEE Standard Test Code for Dry-Type Distribution and Power Transformers	David Walker (520) 484 - 5338 djwalker1260@gmail.com	2020 12/31/2030	2/23/2022 12/31/2026	ACTIVE + PAR for Revision This standard is under continuous revision.
Individual					
PC57.12.91					

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee DRY TYPE TRANSFORMERS					
CHAIR: Casey Ballard		robert.c.ballard@ieee.org	(804) 292 - 5207		
C57.124	IEEE Recommended Practice for the Detection of Partial Discharge and the Measurement of Apparent Charge in Dry-Type Transformers	Thomas Prevost (802) 751 - 3458 tprevost@ieee.org	1991 12/31/2019	6/15/2017 12/31/2023	INACTIVE-RESERVED +PAR for Revision+1PAR extension This is late due to an earlier decision to wait on the development of IEEE C57.113 to keep the testing processes in sync between liquid filled and dry type. For the next revision it has been proposed that these two documents be combined to reduce the effort.
Individual					
PC57.124					
C57.134	IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers	Colby Lovins colby.lovins@ieee.org	2013 12/31/2023	5/21/2021 12/31/2025	ACTIVE + PAR for Revision SA BALLOT closed 11/2/2022 with 50 comments to resolve. Currently in Comment Resolution.
Individual					
PC57.134					
C57.16	IEEE Standard Requirements, Terminology, and Test Code for Dry-Type Air- Core Series- Connected Reactors	J. Arturo Del Rio (919) 449 - 5675 a.delrio@ieee.org	2011 12/31/2021	2/5/2016 12/31/2024	INACTIVE-RESERVED +PAR for Revision+2PAR extension
Individual					
PC57.16					
C57.94	IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers	Ken Kline ken00klein@gmail.com	2015 12/31/2025	2/23/2022 12/31/2026	ACTIVE + PAR for Revision
Individual					
PC57.94					
C57.96	IEEE Guide for Loading Dry-Type Distribution and Power Transformers	Aniruddha Narawane (804) 229 - 5956 aniraj200@yahoo.com	2013 12/31/2023	2/10/2021 12/31/2025	ACTIVE + PAR for Revision
Individual					
PC57.96					

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STANDARD	Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE	Phone	Rev Due Date	PAR Expiration	Remark
PROJECT	Email			
SubCommittee HVDC TRANSFORMERS				
CHAIR:	Ulf Radbrandt	ulf.radbrandt@ieee.org	4 (624) 078 - 3357	
1277	IEEE Standard General Requirements and Test Code for Dry-Type and Oil-Immersed Smoothing Reactors and for Dry-Type Converter Reactors for DC Power Transmission	2020		ACTIVE
Individual		12/31/2030		
60076-57-129	IEC/IEEE International Standard - Power transformers--Part 57-129: Transformers for HVDC applications	2017		ACTIVE
Individual		12/31/2027		

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee INSTRUMENT TRANSFORMERS					
CHAIR: Thomas Sizemore		thomas.sizemore.us@ieee.org	(252) 827 - 3235		
Individual P63253-5713-8	Standard Requirements for Station Service Voltage Transformers	David Wallace (662) 325 - 2009 daweleceng@aol.com		3/21/2019 12/31/2023	Active PAR SA BALLOT closed 12/9/2022 with 163 comments to resolve. Currently in Comment Resolution.
Entity PC57.13.10	Guide for Calibration of Energized Current Transformers for 34.5 kV and Below	Yunguo Yang 77766711@qq.com		3/22/2022 12/31/2026	Active PAR TCR: Thomas Sizemore
Individual PC57.13.9	Standard for Power-Line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers	Zoltan Roman (706) 360 - 4964 zoltan.roman@ge.com		3/23/2017 12/31/2023	Active PAR + 1 PAR Extension SA BALLOT closed 10/21/2022 with 662 comments to resolve. Currently in Comment Resolution. CO-STD-COM – PSCC
C57.13 Individual PC57.13	IEEE Standard Requirements for Instrument Transformers	David Wallace (662) 325 - 2009 daweleceng@aol.com	2016 12/31/2026	3/24/2022 12/31/2026	ACTIVE + PAR for Revision
C57.13 Individual PC57.13-2016CO	IEEE Standard Requirements for Instrument Transformers	David Wallace (662) 325 - 2009 daweleceng@aol.com	2016 12/31/2026	3/21/2019 12/31/2023	ACTIVE + PAR for Corrigenda
C57.13.2 Individual PC13.2	Conformance Test Procedure for Instrument Transformers	Thomas Sizemore (252) 827 - 3235 thomas.sizemore.us@ieee.org	2005 12/31/2020	12/6/2017 12/31/2023	INACTIVE-RESERVED+PAR for Revision+1 PAR extension SA BALLOT closed 11/13/2022 with 50 comments to resolve. Currently in Comment Resolution.
C57.13.5 Individual	Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above		2019 12/31/2029		ACTIVE
C57.13.6 Individual	Standard for High Accuracy Instrument Transformers		2005 12/31/2020		INACTIVE-RESERVED

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BALLOT TYPE	Phone	Rev Due Date	PAR Expiration	Remark
PROJECT	Email			
SubCommittee INSTRUMENT TRANSFORMERS				
CHAIR: Thomas Sizemore	thomas.sizemore.us@ieee.org		(252) 827 - 3235	
C57.13.7	IEEE Standard for Current Transformers with	2018		ACTIVE
Individual	Maximum Milliampere Secondary Current of 250 mA	12/31/2028		

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BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee INSULATING FLUIDS					
CHAIR: Scott Reed		sreed@mvadiagnostics.com	(330) 498 - 6259		
Individual PC57.166	Guide for Acceptance and Maintenance of Insulating Liquids in Transformers and Related Equipment	Thomas Prevost (802) 751 - 3458 tprevost@ieee.org		3/8/2018 12/31/2024	Active PAR + 1 PAR extension This Standard will combine C57.106, C57.111, C57.121 and C57.147 plus added content.
C57.104 Individual	IEEE Guide for the Interpretation of Gases Generated in Mineral Oil-Immersed Transformers		2019 12/31/2029		ACTIVE
C57.106 Individual	IEEE Guide for Acceptance and Maintenance of Mineral Insulating Oil in Electrical Equipment		2015 12/31/2025		ACTIVE This will be contained in the new C57.166 standard.
C57.111 Individual	IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers		1989 3/19/2019		INACTIVE-RESERVED This will be contained in the new C57.166 standard.
C57.121 Individual	IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers		1998 12/9/2019		INACTIVE-RESERVED This will be contained in the new C57.166 standard.
C57.130 Individual PC57.130	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	Bruce Forsyth (405) 473 - 8300 bruce.forsyth@ieee.org	2015 12/31/2025	3/24/2022 12/31/2026	ACTIVE - PAR for Revision
C57.139 Individual PC57.139	Guide for Dissolved Gas Analysis in Transformer Load Tap Changers	Rainer Frotscher r.frotscher@reinhausen.com	2015 12/31/2025	3/24/2022 12/31/2026	ACTIVE - PAR for Revision
C57.146 Individual PC57.146	Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers	Paul Boman (785) 256 - 7161 paul_boman@hsb.com	2005 12/31/2021	3/5/2020 12/31/2024	INACTIVE-RESERVED + PAR for Revision
C57.147 Individual	Guide for Acceptance and Maintenance of Natural Insulating Liquid in Transformers		2018 12/31/2028		ACTIVE This will be contained in the new C57.166 standard.

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee INSULATING FLUIDS					
CHAIR:	Scott Reed	sreed@mvadiagnostics.com		(330) 498 - 6259	
C57.155	IEEE Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers	Alan Sbravati	2014	9/23/2021	ACTIVE + PAR for Revision
Individual		(612) 413 - 4599	12/31/2024		
PC57.155		alan_sbravati@cargill.com		12/31/2025	
C57.637	IEEE Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use	Stephanie Denzer	2015	9/23/2021	ACTIVE + PAR for Revision
Individual		(330) 581 - 4103	12/31/2025		
PC57.637		stephaniedenzer@alliantenerg		12/31/2025	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee INSULATION LIFE					
CHAIR: Samuel Sharpless		slsharpless@rimkus.com		(407) 661 - 1245	
Individual PC57.162	Guide for the Interpretation of Moisture Related Parameters in Liquid Immersed Transformers and Reactors	Thomas Prevost (802) 751 - 3458 tprevost@ieee.org		8/23/2013 12/31/2023	Active PAR + 3 PAR Extensions SA Ballot: Balloting This will not get another extension without significant extenuating circumstances.
Individual PC57.165	Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors	Mark Tostrud (262) 746 - 1230 mark.tostrud@dynamicratings.		2/17/2017 12/31/2023	Active PAR + 1 PAR Extension SA BALLOT: Balloting invitation to close 3/2/2023.
1276 Individual P1276a	IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Distribution, Power, and Regulating Transformers	Kevin Biggie kevin.biggie@weidmann-group	2020 12/31/2030	3/23/2022 12/31/2026	ACTIVE + PAR for Amendment Amendment: Update to Annex B and corresponding reference in Annex D.
1538 Individual	IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid Filled Transformer		2000 12/31/2021		INACTIVE-RESERVED Please note that this document will be allowed to go inactive as it is being replaced by C57.169.
1538a Individual	IEEE Guide for Determination of Maximum Winding-Temperature Rise in Liquid Immersed Transformers -- Amendment 1		2015 12/31/2021		INACTIVE-RESERVED Please note that this document will be allowed to go inactive as it is being replaced by C57.169.
C57.100 Individual	IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution and Power Transformers		2022 12/31/2032		ACTIVE
C57.119 Individual	IEEE Recommended Practice for Performing Temperature Rise Tests on Liquid Immersed Power Transformers at Loads Beyond Nameplate Ratings		2018 12/31/2028		ACTIVE
C57.154 Individual	IEEE Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid--Immersed Transformers		2022 12/31/2032		ACTIVE
C57.169 Individual	Guide for Determination of Maximum Winding Temperature Rise in Liquid-Immersed Transformers		2023 12/31/2033		ACTIVE

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BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee INSULATION LIFE					
CHAIR: Samuel Sharpless		slsharpless@rimkus.com		(407) 661 - 1245	
C57.91	IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators	David Wallach	2011	9/28/2017	INACTIVE-RESERVED + PAR for Revision
Individual		(980) 373 - 4167	12/31/2021		
PC57.91		david.wallach@duke-energy.c		12/31/2023	

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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee PERFORMANCE CHARACTERISTICS					
CHAIR: Rogério Verdolin		roger.verdolin@ieee.org	(403) 850 - 4304		
Entity	Guide for the Selection of Neutral-Grounding Devices for High Voltage Direct Current (HVDC) Converter Transformers	Zhang Hua		10/30/2018	Active PAR
C57.32.10		zhanghua002@163.com		12/31/2024	TCR: Rogério Verdolin
Entity	Guide for Detection, Monitoring, and Evaluation of Winding Deformation in Liquid-Immersed Power Transformers	Xianjun Shao		9/23/2021	Active PAR
PC57.141		shaoxianjun0575@163.com		12/31/2025	TCR: Poori Patel
C57.105	IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems	Rogério Verdolin	2019	12/3/2020	ACTIVE + PAR for Corrigenda
Individual		(403) 850 - 4304	12/31/2029		Corrigenda to update Table 1 of the current standard. SA
PC57.105/Cor 1		roger.verdolin@ieee.org		12/31/2024	BALLOT: Balloting scheduled to close 3/15/2023.
C57.109	IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration		2018		ACTIVE
Individual			12/31/2028		
C57.110	IEEE Recommended Practice for Establishing Liquid Immersed and Dry-Type Power and Distribution Transformer Capability when Supplying Nonsinusoidal Load Currents		2018		ACTIVE
Individual			12/31/2028		
C57.120	IEEE Guide for Loss Evaluation of Distribution and Power Transformers and Reactors		2017		ACTIVE
Individual			12/31/2027		
C57.123	IEEE Guide for Transformer Loss Measurement		2019		ACTIVE
Individual			12/31/2029		
C57.136	IEEE Guide for Sound Level Abatement and Determination for Liquid- Immersed Power Transformers and Shunt Reactors Rated Over 500 kVA	Stephen Antosz	2000	2/10/2021	INACTIVE-RESERVED + PAR for Revision
Individual		(412) 498 - 3916	12/31/2018		SA BALLOT: Balloting - First Recirculation - scheduled to close 3/9/2023
PC57.136		santosoz@ieee.org		12/31/2025	

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BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee PERFORMANCE CHARACTERISTICS					
CHAIR: Rogério Verdolin		roger.verdolin@ieee.org	(403) 850 - 4304		
C57.142	A Guide To Describe The Occurrence And Mitigation Of Switching Transients Induced By Transformer-Breaker Interaction	Jim McBride	2010	3/23/2017	INACTIVE-RESERVED+PAR Revision+1 PAR Extension
Individual		(770) 460-6626	12/31/2020		SA BALLOT closed 4/27/22 with 305 comments to resolve. Currently in Comment Resolution. CO-STD-COM – Switchgear
PC57.142		jim@jmxhv.com		12/31/2023	
C57.149	Guide for the Application and Interpretation of Frequency Response Analysis for Oil Immersed Transformers	Charles Sweetser	2012	6/14/2018	INACTIVE-RESERVED+PAR Revision+1 PAR Extension
Individual		(617) 901 - 6180	12/31/2022		SA BALLOT: Balloting invitation to close 3/16/2023.
PC57.149		charles.sweetser@omiconene		12/31/2024	
C57.158	IEEE Guide for the Application of Tertiary and Stabilizing Windings in Power Transformers		2017		ACTIVE
Individual			12/31/2027		
C57.159	IEEE Guide on Transformers for Application in Distributed Photovoltaic (DPV) Power Generation Systems		2016		ACTIVE
Individual			12/31/2026		
C57.164	Guide for Establishing Short Circuit Withstand Capabilities of Liquid Immersed Power Transformers, Regulators, and Reactors		2021		Active
Individual			12/31/2031		
C57.18.10	IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers		2021		ACTIVE
Individual			12/31/2031		
C57.21	IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA		2021		ACTIVE
Individual			12/31/2031		
C57.32	IEEE Standard Requirements, Terminology, and Testing Procedures for Neutral Grounding Devices	Sheldon Kennedy	2015	2/15/2023	ACTIVE + PAR for Revision
Individual		(716) 896 - 6500	12/31/2025		
PC57.32		skennedy@niagaratransformer		12/31/2027	

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD	Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE	Phone	Rev Due Date	PAR Expiration	Remark
PROJECT	Email			
SubCommittee PERFORMANCE CHARACTERISTICS				
CHAIR: Rogerio Verdolin	roger.verdolin@ieee.org		(403) 850 - 4304	
C57.32a	IEEE Standard for Requirements, Terminology, and Test Procedure for Neutral Grounding Devices--Amendment 1: Neutral Grounding Resistors Clause (AM)	2020		ACTIVE
Individual		12/31/2025		

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee POWER TRANSFORMERS					
CHAIR: Ryan Musgrove		ryan.musgrove@ieee.org	(405) 747 - 7960		
Individual PC57.107	Recommended Practice for Developing Design-Specific Operational Limits for Transformers Connected to Generators or Power Systems Subject to Significant Short-Term Changes in Voltage or Frequency	Joe Watson (561) 371 - 9138 joe_watson@ieee.org		9/23/2021	Active PAR
				12/31/2025	
Individual PC57.170	Guide for the Condition Assessment of Liquid Immersed Transformers, Reactors and Their Components	Kumar Mani (919) 546 - 2791 kumar.mani@duke-energy.co		9/5/2019	Active PAR
				12/31/2023	
Entity PC57.93a	IEEE Approved Draft Guide for Installation and Maintenance of Liquid-Immersed Power Transformers Amendment: Cold Start of Power Transformers filled with Natural Ester Fluids	Wei Yao yaoweidky@163.com		3/5/2020	Active PAR for Amendment TCR: Scott Reed
				12/31/2024	
60076-16 Individual	IEC/IEEE International Standard - Power transformers - Part 16: Transformers for wind turbine applications		2018		ACTIVE
			12/31/2028		
60076-57-1202 Individual	IEC/IEEE International Standard Power transformers --Part 57-1202: Liquid immersed phase-shifting transformers		2016		ACTIVE
			12/31/2026		
60214-2 Individual	IEEE Draft Standard for Tap-Changers - Part 2: Application Guide		2019		ACTIVE
			12/31/2029		
638 Individual	IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations		2013		ACTIVE
			12/31/2023		
C57.116 Individual	IEEE Guide for Transformers Directly Connected to Generators		2022		ACTIVE
			12/31/2032		

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee POWER TRANSFORMERS					
CHAIR:	Ryan Musgrove	ryan.musgrove@ieee.org	(405) 747 - 7960		
C57.12.10	Standard Requirements for Liquid-Immersed Power Transformers		2017		ACTIVE
Individual			12/31/2027		
C57.125	IEEE Guide for Failure Investigation, Documentation, Analysis, and Reporting for Power Transformers and Shunt Reactors	Hakan Sahin (208) 220-6963 hakanshaun@gmail.com	2015	5/21/2021	ACTIVE+ PAR for Revision
Individual			12/31/2025	12/31/2025	
PC57.125					
C57.131	IEEE Standard Requirements for Tap Changers	Craig Colopy (262) 896 - 2342 craigacolopy@eaton.com	2012	12/3/2020	INACTIVE-RESERVED + PAR for Revision
Individual			12/31/2022	12/31/2024	
PC57.131					
C57.135	IEEE Guide for the Application, Specification and Testing of Phase- Shifting Transformers	Ewald Schweiger	2011	6/16/2022	INACTIVE-RESERVED + PAR for Revision
Individual			12/31/2021	12/31/2026	
PC57.135					
C57.140	IEEE Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers		2017		ACTIVE
Individual			12/31/2027		
C57.143	Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components	Mike Spurlock (614) 933 - 2284 mspurlock@ieee.org	2012	2/17/2017	INACTIVE-RESERVED + PAR for Revision
Individual			12/31/2022	12/31/2023	
PC57.143					
C57.148	Standard for Control Cabinets for Power Transformers		2020		ACTIVE
Individual			12/31/2030		
C57.150	IEEE Guide for the Transportation of Transformers and Reactors Rated 10 000 kVA or Higher	Gregory Anderson (402) 680 - 1111 gwanderson@ieee.org	2012	3/23/2017	INACTIVE-RESERVED+PAR Revision+1 PAR Extension
Individual			12/31/2022	12/31/2023	
PC57.150					
C57.153	Guide for Paralleling Power Transformers		2015		ACTIVE
Individual			12/31/2025		

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD	Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE	Phone	Rev Due Date	PAR Expiration	Remark
PROJECT	Email			
SubCommittee POWER TRANSFORMERS				
CHAIR: Ryan Musgrove	ryan.musgrove@ieee.org	(405) 747 - 7960		
C57.156 Individual	IEEE Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors	2016 12/31/2026		ACTIVE
C57.157 Individual	IEEE Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid--Immersed Transformers	2015 12/31/2025		ACTIVE
C57.17 Individual	Standard Requirements for Arc Furnace Transformers	2012 12/31/2022		INACTIVE-RESERVED
C57.93 Individual	IEEE Approved Draft Guide for Installation and Maintenance of Liquid-Immersed Power Transformers	2019 12/31/2029		ACTIVE

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee STANDARDS					
CHAIR: Daniel Sauer		dmsauer@mtu.edu	(262) 896 - 2417		
C57.12.00	IEEE Standard for General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers	Eric Davis	2021	5/13/2022	ACTIVE - PAR for Revision
Individual		(816) 760 - 2627	12/31/2031		This standard is under continuous revision.
PC57.12.00		edavis@burnsmcd.com		12/31/2026	
C57.12.70	IEEE Standard For Standard Terminal Markings and Connections for Distribution and Power Transformers		2020		ACTIVE
Individual			12/31/2030		
C57.12.80	IEEE Standard Terminology for Power and Distribution Transformers	Daniel Sauer	2010	3/23/2017	INACTIVE-RESERVED+PAR for Revision+1 PAR Extension
Individual		(262) 896 - 2417	12/31/2020		
PC57.12.80		dmsauer@mtu.edu		12/31/2023	
C57.12.90	IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers	Stephen Antosz	2021	5/13/2022	ACTIVE - PAR for Revision
Individual		(412) 498 - 3916	12/31/2031		This standard is under continuous revision
PC57.12.90		santos@ieee.org		12/31/2026	
C57.144	Guide for Metric Conversion of Transformer Standards		2004		INACTIVE-RESERVED
Individual			12/31/2020		This was to be incorporated into P947 but this project has been withdrawn. This needs to be reviewed in light of QUSCOM (formerly SCC14) documents.
C57.152	IEEE Guide for Diagnostic Field Testing of Fluid-Filled Power Transformers, Regulators, and Reactors	Marcos Ferreira	2013	6/13/2019	ACTIVE + PAR for Revision
Individual		(971) 703 - 0777	12/31/2023		
PC57.152		mdferreira@comcast.net		12/31/2023	
C57.163	IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances	Daniel Blaydon	2015	3/5/2020	ACTIVE + PAR for Revision
Individual		(410) 470 - 8827	12/31/2025		Corrigenda 1 will be included with this Revision. C57.163-2015-Corrigenda 1 will be allowed to expire. SA BALLOT: Balloting scheduled to close 3/2/2023.
PC57.163		dblaidon@ieee.org		12/31/2024	

IEEE/PES TRANSFORMERS COMMITTEE

Status Report of Transformers Standards

STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
BALLOT TYPE		Phone			
PROJECT		Email	Rev Due Date	PAR Expiration	Remark
SubCommittee SUBSURFACE TRANSFORMERS & NETWORK PROTECTORS					
CHAIR: George Payerle		georgepayerle@gmail.com		(330) 908 - 0418	
Individual	IEEE Guide for Mitigating Corrosion on Subsurface Transformers and Network Protectors	William Elliott (318) 286-2868 will.elliott@alumni.lsu.edu		2/23/2022	Active PAR
PC57.12.53				12/31/2026	
C57.12.23	IEEE Standard for Submersible Single-Phase Transformers: 250 kVA and Smaller; High Voltage 34 500 GrdY/19 920 V and Below; Low Voltage 600 V and Below		2018		ACTIVE
Individual			12/31/2028		
C57.12.24	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	Benjamin Garcia (714) 895-0787 benjamin.garcia@sce.com	2016	2/8/2019	ACTIVE + PAR for Revision
Individual			12/31/2026		SA BALLOT closed 2/2/23 with 78 comments to resolve. Currently in Comment Resolution.
PC57.12.24				12/31/2023	
C57.12.40	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)	John Varatanian john.vartinian@nationalgrid.co	2017	5/21/2019	ACTIVE + PAR for Revision
Individual			12/31/2027		
PC57.12.40				12/31/2023	
C57.12.44	IEEE Standard Requirements for Secondary Network Protectors	Mark Faulkner (864) 993-0509 markafaulkner@eaton.com	2014	3/26/2015	ACTIVE + PAR for Revision + 2 PAR Extension
Individual			12/31/2024		SA BALLOT closed 10/13/21 with 69 comments to resolve. Currently in Comment Resolution.
PC57.12.44				12/31/2023	
C57.12.57	Requirements for Ventilated Dry-Type Network Transformers 2500 kVA and Below, Three-Phase with High Voltage 34 500 Volts and Below, Low Voltage 216Y/125 and 480Y/125 Volts		1992		INACTIVE-RESERVED
Individual			12/31/2000		THIS STANDARD WILL STAY IN THE "INACTIVE-RESERVED" STATUS AND WILL NOT BE REVISED DUE TO LOW USE OF THIS PRODUCT.

APPENDIX 3

CIGRE Liaison Report

CIGRÉ International Council on Large Electric Systems

Liaison Report on SCA2
Transformers for
IEEE Transformers
Committee- Spring 2023
Meeting

- March 20, 2023



CIGRÉ 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 Recent Publications

- **Brochure: High-frequency transformer models for non-standard waveforms**
 - From Working Group A2/C4.52
 - Brochure to be published Q2 2023
- **Brochure: Power Transformer Efficiency**
 - From Working Group A2.56
 - Brochure to be published Q2 2023

SC A2 WG Activities

No.	Working Group	Topic	Status
1	A2/C4.52	HF Transformer and Reactor Models	Issued for Publication
2	A2.53	FRA Interpretation	Active
3	A2.54	Audible Sound Requirements	Active
4	A2.56	Transformer Efficiency	Issued for Publication
5	A2.57	Effects of DC Bias	Active
6	A2.58	Site Installation and Pre-commissioning of Power Transformers and Shunt Reactors	Active
7	A2.60	Dynamic Thermal Performance of Power Transformers	Active
8	A2.61	Best Practices for On-Load Tap Changers (OLTC)	Active

SC A2 WG Activities

No.	Working Group	Topic	Status
9	A2.62	Analysis of AC Transformer Reliability	Active
10	A2.63	Transformer Impulse Testing	Active
11	A2.64	Condition of Cellulose Insulation in Oil Immersed Transformers After Factory Acceptance Tests	Active
12	D1/A2.77	Tests for Insulating Fluids	Active
13	A2/D2.65	Transformer Digital Twin- concept and future perspectives	Active
14	A2/D1.66	Breathing systems of liquid filled transformers and reactors	Active
15	A2.67	Guideline for Online Dissolved Gas Analysis Monitoring	Active
16	A2.68	Failure Survey of Lower Voltage Generator Step Up Transformers installed in Wind farms and Photovoltaic Parks	Starting
17	A2.69	Guide for Transformer Maintenance	Starting

Upcoming New Working Groups

1. **Replacing Mineral Oil in Transformers:** JWG with D1 (Materials and emerging test techniques) on the retro-filling with alternative liquids.
2. **Life Cycle Assessment (LCA) for Transformers:** JWG with C3 (Power system environmental performance) on the CO2 emissions assessment with respect to new requirements/regulations.
3. **Transformer and OLTC Applications with Modern Insulating Liquids:** JWG with D1 (Materials and emerging test techniques) on the qualification process of new insulating liquids for application to transformers and OLTCs.

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

TF and AG activities

- Task Force (TF): Transformer Field Noise Measurement
- Task Force (TF): Power Transformer Tank Specification for Passive Protection Against Internal Arc
- 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 now available!

Upcoming Events

- **CIGRÉ Symposium**
 - Cairns, Australia, September 4-7, 2023
 - Cairns Convention Center
- **CIGRÉ USNC Grid of the Future**
 - Kansas City, MO, October 9-12, 2023
 - The Westin Kansas City at Crown Center
 - Full papers due July 28, 2023
- **CIGRÉ A2 Study Committee Colloquium**
 - Split, Croatia, November 29-December 2, 2023
 - Le Méridien Lav
 - Paper abstracts due Apr. 1, 2023
 - Full papers due Sep. 3, 2023
 -
- **CIGRÉ Paris Session 2024**
 - Paris, France, August 25-30, 2024
 - Palais des Congrès
 - Paper synopsis due Aug. 26, 2023
 - Full papers due Feb. 6, 2024

IEEE Liaison Report

THANK YOU!



APPENDIX 4

IEC TC10 Liaison Report



International
Electrotechnical
Commission

IEC TC10 Fluids for electrotechnical applications

Ed Casserly

Status Report to
IEEE/PES Transformer Committee
March 20, 2023 - Milwaukee, WI



International
Electrotechnical
Commission

TC10 Scope

To prepare product specifications, test methods as well as maintenance and use guides for liquid and gaseous dielectrics. Also to prepare specifications and maintenance and use guides for lubricants and control fluids for steam turbines, generators and control systems as well as to assist in the preparation of test methods for such fluids.

Chair – Ivanka Höhlelein-Atanasova, Ph.D. (DE)

Secretary – Massimo Pompili, Ph.D. (IT)



International
Electrotechnical
Commission

General Information TC10

- Membership (countries) 42
 - P-Members (Participating) 30
 - O-Members (Observer) 12
- Currently Active MT, PT, WG, AG, ahG 11
- Documents in charge of (TR, TS, IS) 63
 - Under maintenance/in development 11+1
 - IEC/IEEE common documents
 - Organized by national committees
 - 1 voter per national committee
 - Only 2/3 approval needed



International
Electrotechnical
Commission

TC10 Plenary Meeting

- Plenary Meeting = Strategy meeting
 - Review projects' progress, update work program
 - Initiate new work item proposals
 - Bi-annual meeting – In person 2019 (Fountainbleau); 2021 (Virtual)
- Last meeting, June 2022 Bled (SLO)
 - Joint meeting with TC14
 - Hybrid meeting – 73 participants (~25 in-person)
 - 3 USNC TAG representatives (2 in-person; 1 virtual)
- Next meeting – Summer 2024, Rome, IT
- Working Groups meet as necessary



International
Electrotechnical
Commission

New/Revised Standards Since 2021 Plenary

- IEC TR 63025 Ed 1.0; Insulating liquids - Quantitative determination of methanol and ethanol in insulating liquids; 2021-07
- IEC 60599 Ed 4.0; Insulating liquids - Mineral oil-filled electrical equipment in service – Guidance on the interpretation of dissolved and free gases analysis; 2022-05
- IEC 60475 Ed 3.0; Method of sampling insulating liquids; 2022-05
- IEC 60867 Ed 3.0; Insulating liquids - Specifications for unused liquids based on synthetic aromatic hydrocarbons; 2022-10



International
Electrotechnical
Commission

Standards Currently Under Revision (1)

- **MT22**
 - CD CC - 60422 ED5: Mineral insulating oils in electrical equipment - Supervision and maintenance guidance
- **MT25**
 - CDV - 60567 ED5: Oil-filled electrical equipment - Sampling of gases and analysis of free and dissolved gases – Guidance
- **MT30**
 - CD CC - 60156 ED4: Insulating liquids - Determination of the breakdown voltage at power frequency - Test method
 - CD - TR 61294 ED2: Insulating liquids - Determination of the partial discharge inception voltage (PDIV) - Test procedure



International
Electrotechnical
Commission

Standards Currently Under Revision (2)

- **MT36**
 - CDV - 62770 ED2: Fluids for electrotechnical applications - Unused natural esters for transformers and similar electrical equipment
 - CD CC - 61203 ED2: Synthetic organic esters for electrical purposes - Guide for maintenance of transformer esters in equipment
 - CDV CC - 61039 ED3: Classification of insulating liquids
- **MT42**
 - CD - 60465 ED3: Specification for unused insulating mineral oils for cables with oil ducts
- **MT43**
 - CD - 60666 ED3: Detection and determination of specified additives in mineral insulating oils
 - Partially concurrent with ASTM D27.03



International
Electrotechnical
Commission

Standards in Development/Deleted

- **WG41**
 - CD - 63359 ED1 Fluids for electrotechnical application: Specifications for the re-use of mixtures of gases alternative to SF₆
 - CDV - 63360 ED1: Fluids for electrotechnical application: Mixtures of gases alternative to SF₆
- **WG45** - Interpretation of DGA analysis in natural and synthetic esters
- **ahG44** – 61144 ED1.0 Test method for the determination of oxygen index of insulating liquids
 - ahG44 recommended that the standard be deleted



International
Electrotechnical
Commission

Future Consideration

- Liquids for electric vehicles (e-traction)
- Liquids for data center cooling (immersion)

APPENDIX 5

IEC TC14 Liaison Report



IEC TC14 Power Transformers

Chairman: Christoph Ploetner, DE

Secretary: Stephanie Lavy, UK

Status Report to

IEEE Transformers Committee

2023 March, Milwaukee





General Information TC 14

- Membership (countries) 48
 - **P - Members** 35
 - **O - Members** 13
- Registered experts 337
- Currently active MT, PT, WG, AG, AHG 11 + 2 joint groups
- Documents in charge of (TR, TS, IS) 40
 - **under maintenance / in development** 9 / 1
 - **IEC/IEEE common documents** 6



TC 14 Plenary Meeting

- Plenary meeting = Strategy meeting
 - review projects' progress, update work program
 - initiate new work item proposals – decide on WG Chairs
 - hold on yearly basis
- Last meeting 2022 Bled (SLO), June 2022
 - hybrid meeting - 86 participants (~30 in-person)
- Next meeting 2023 Boston, MA, June 22-23
 - face-to-face meeting – Delegates need to register via IEC Websystem



New Document published

IEC 60076-25 Neutral Grounding Resistors

- published Feb. 23rd
- sister document to IEEE C57.32 / C57.32a
Standard for requirements ... for
Neutral Grounding Devices



List of revisions in progress

- IEC 60076-1 General
- IEC 60076-2 Temperature rise test
- IEC 60076-4 Guide to LI and SI testing
- IEC 60076-5 Ability to withstand short circuit
- IEC 60076-6 Reactors
- IEC 60076-9 Terminal and tapping markings
- IEC 60076-18 Measurement of Frequency Response
- IEC 60076-19 Uncertainties in Loss Measurements
- IEC 62032 Phase Shifter Guide (dualLogo with IEEE C57.135)



Important working groups

- Advisory Group 39
 - **Functional classification of power transformers, reactors and accessories**
 - recommend updates of definitions, performances and classifications
 - advise on Scope and Strategic Business Plan
 - recommend standardization activities and their relative importance
- Ad-Hoc Group 40
 - **Power transformers related to energy transition such as PV, battery storage, e-chargers and hydrogen generation**
 - Develop an outline for a TR



IEC-IEEE relevant meetings this week (selected)

- USTAG Meeting (Phil Hopkinson)
 - Review TC 14 work program
 - Review specifically Dual Logo documents – stability dates
 - Discuss general interaction IEEE Transformers Committee – IEC TC14
- WG C57.135 Guide for Phase-shifting transformers (Ewald Schweiger)
 - IEEE C57.135 will be merged with IEC 62032 into IEC/IEEE 60076-57-135
 - Sister WG on IEC side in setup process (will soon be completed)
- WG C57.131 Standard Requirements for Tap Changers (Craig Colopy)
 - Revision focus: Update and alignment of document with IEC 60214-1
 - Draft document completed – Copyright aspects still to clarify with IEC

APPENDIX 6

Standards Coordinating Committee No. 4

March 20, 2023

**IEEE PES Transformers Committee
Liaison Report for General Session Meeting – March 20, 2023
Standards Coordinating Committee on Electrical Insulation – SCC 04**

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 99-2019** Recommended Practice for the Preparation of Test Procedures for the Thermal Evaluation of Insulation Systems for Electrical Equipment

3. Current Activities:

- **IEEE 1** – Standard expired 12/31/2021. PAR expires 12/31/2024. Document revision is currently in progress.

Interested in participating?

- SCC04 – Evanne Wang (evanne.wang@dupont.com)
- IEEE 1 – Brad Greaves (brad.greaves@weidmann-group.com)

Respectfully submitted,
Evanne Wang

APPENDIX 7

ASTM

ASTM Committee D27 Electrical Insulating Liquids and Gases Liaison Report

Ed Casserly

IEEE/PES Transformers Committee

March 20, 2023

Milwaukee, Wisconsin

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 130 members, currently has jurisdiction of over 50 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:	Lance R. Lewand
Vice-chairman:	Edward W. Casserly
Secretary:	Michael Bonn
Staff manager:	Kelly Paul
Admin assistant:	Samantha Martin
Editor:	Julia Porter

D27 Committee Membership

Classification	Official	Non-Official	Total
Producer	19	15	34
User	8	3	11
Consumer	0	0	0
General Interest	53	32	85
Total	80	50	130

- Organized by company, organization, or individual
- 1 official vote per company, organization, or individual
- Unanimous approvals – all negatives must be resolved, even from non-voting members

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.

ASTM D27 Hot Topics (1)

Last meeting: Oct 31 – Nov 1, 2022 New Orleans, Hybrid in-Person/Virtual

Subcommittee Reports

D27.01 - Mineral Oils, Griffin Burk:

- **ASTM D8180-23** - **New standard**: Specification for Re-refined Mineral Insulating Liquid Used in Electrical Apparatus, **approved Jan 1, 2023**.
- **ASTM D5222-23** – Specification for Less Flammable High Molecular Weight Hydrocarbon Mineral Electrical Insulating Liquids, **approved January 1, 2023**.
 - **New title**, previously, “High Fire Point Mineral Electrical Insulating Oils”
- **ASTM D3487-16** – Specification for Mineral Insulating Oil Used in Electrical Apparatus
 - **Currently under revision, WK83455**

ASTM D27 Hot Topics (2)

Subcommittee Reports

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

- **ASTM D8240-22** Specification for Less-Flammable Synthetic Ester Liquids Used in Electrical Apparatus (IEC 61099), **approved August, 2022**.
 - **New standard; requires disclosure of additives.**
- **ASTM D6871-17** Specification for Natural (Vegetable Oil) Ester Fluids Used in Electrical Apparatus.
 - **Currently under revision, WK81903**

ASTM D27 Hot Topics (3)

D27.03 - Analytical Tests, Claude Beauchemin:

- **WK81449** New Standard For the determination of additives in insulating liquids - Part 1 - Determination of phenolic antioxidants using liquid chromatography (LC)
 - (Technical Contact: Casserly, Edward W)
- Work is on-going. Part 1 is on the determination of phenolic antioxidants using liquid chromatography (LC) and a draft has been issued.
 - Concurrent with IEC TC10 MT43 revision of 60666.
 - IEEE ICDL 2022 paper published.

ASTM D27 Hot Topics (4)

D27.05 - Electrical Tests, Sandra Smith:

D27.06 - Chemical Tests, Lance Lewand:

D27.07 - Physical Tests, Nathan Ginder:

D27.95 - Awards, Special Events, Bylaws, Janet Lloyd

ASTM D27 Hot Topics (5)

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

Task Group Reports

- a) WK68133 – Oxidation Stability of Natural and Synthetic Ester Liquids using OIT by DSC – submitted for development to D27.06 SC. Current draft to be posted to collaboration site is v11.
- b) Oxidation of Natural Ester Liquids using Non-DSC Methods – L. Lewand
Working on use of D2112 to assess. No updates.
- c) Partial Discharge – Tom Prevost – No report as Tom was not present.
- d) Relative Saturation of Water in Insulating Liquids – Lance Lewand – Status unchanged and no updates.

D27.91 - IEC TC 10 Advisory, Ed Casserly:

Ed Casserly presented the IEC TC 10 Advisory report.

Future Meetings

Monday May 8, 2023 – Tuesday May 9, 2023

Location: Sheraton Denver Downtown, Denver CO

Monday Nov 6, 2023 – Tuesday Nov 7, 2023

Location: Washington Hilton, Washington DC

Monday May 6, 2024 – Tuesday May 7, 2024

Location: Philadelphia Marriott Downtown, Philadelphia, PA

Monday November 11, 2024 – Tuesday November 12, 2024

Location: Renaissance Orlando at SeaWorld, Orlando, FL



APPENDIX 8

Transactions Power Delivery

General Sessions

Opening Session

Monday, March 20, 2023: 8:00 am - 9:15 am CDT (UTC-06:00)

10.6. Transactions on Power and Delivery (TPWRD) Editor Liaison

Editor's Report (26.02.2023)

During 2022 until February 26, 2023, a total of 119 papers were and are in the editorial review in the transformer area of IEEE Transactions on Power Delivery for possible publication. For all of these papers the recommendations were as follows:

Accept	30
Under review	11
Reject	53
Editorial / Administrative Reject	25
TOTAL (During 2022 until February 26, 2023)	119
The above numbers include reviews managed by all editors.	

The papers accepted for publication are shown below:

DOI / Accepted	Title / Accepted
10.1109/TPWRD.2022.3177137	Electromagnetic Modeling of Transformers in EMT-type Software by a Circuit-Based Method
10.1109/TPWRD.2022.3173431	An Inrush Current Suppression Strategy for UHV Converter Transformer Based on Simulation of Magnetic Bias
10.1109/TPWRD.2022.3149968	Modeling and Analysis of Power Imbalance for Power Electronics Transformers with Multi-Bus Structure
10.1109/TPWRD.2022.3222518	Identifying Inrush Current for Large-scale Wind Parks Transformers Based on Difference Function of Differential Current
10.1109/TPWRD.2023.3243887	DC Impedance Modeling of Push-Pull DC Auto-transformer for MMC and LCC HVDC Interconnections
10.1109/TPWRD.2022.3181978	Spectro-Temporal Self-similarity based Identification of Corrupted Acoustic Signal of Distribution Transformer in Noisy Environment
10.1109/TPWRD.2022.3152745	Modeling the Aging-dependent Reliability of Transformers Considering the Individualized Aging Threshold and Lifetime
10.1109/TPWRD.2022.3147410	Application of Polymer Matrix Composites in Large Power Transformer Tanks
10.1109/TPWRD.2022.3228770	Influence of Operational Defects and Hotspot Temperature on Methanol Concentration in Transformer Oil

10.1109/TPWRD.2022.3217726	Research on Oil Pressure Rise and Fluctuation Due to Arcing Faults Inside Transformers
10.1109/TPWRD.2022.3214101	Optimal Dielectric Design of Medium Voltage Toroidal Transformer with Electrostatic Shield Under Fast Front Excitation
10.1109/TPWRD.2022.3204333	Test and Analysis on Extended Temperature Rise of 110 kV Transformer Based on Distributed Temperature Sensing
10.1109/TPWRD.2022.3212322	Estimation of Hot-Spot Heating in Transformer Bushings due to Geomagnetically Induced Current
10.1109/TPWRD.2022.3147014	Research on Neutral Grounding Mode of Interconnecting Transformer in Renewable Energy Plant
10.1109/TPWRD.2022.3200090	Research and Experiment Verification of the Shielding Effect of a UHV Equipotential Shielding Capacitor Voltage Transformer in Consideration of Leakage Current
10.1109/TPWRD.2022.3180625	Functional definition and classification of the power transformer
10.1109/TPWRD.2022.3171204	A Thermally-based Dynamic Approach to the Load Management of Distribution Transformers
10.1109/TPWRD.2023.3245123	Dynamic Model of a Virtual Air Gap Reactor
10.1109/TPWRD.2022.3148598	Diagnosing disk-space variation in transformer windings using high-frequency inductance measurement
10.1109/TPWRD.2022.3145003	Dynamic Thermal Model for Oil Directed Air Forced Power Transformers with Cooling Stage Representation
10.1109/TPWRD.2022.3162174	Experimental verification of 2.4 kVAr and 12 kVAr prototype variable inductors controlled by virtual air gaps with magnetic orthogonality
10.1109/TPWRD.2022.3142889	A Reduced Radiator Model for Simplification of ONAN Transformer CFD Simulation
10.1109/TPWRD.2022.3150303	Analysis and Optimized Design of a Novel Compact Orthogonal Controllable Reactor
10.1109/TPWRD.2022.3209878	Methodology for the Fast Calculation of the Impedance Matrix of Power Transformers for High Frequency Transient Studies
10.1109/TPWRD.2022.3184327	A Magnetically Controlled Current Transformer for Stable Energy Harvesting
10.1109/TPWRD.2022.3179321	A Novel Current Transformer Based on Virtual Air Gap and Its Basic Measuring Characteristics
10.1109/TPWRD.2022.3211667	Winding Overvoltage Characteristic Analysis of Modular Cascade Isolating Energy Supply Transformer of ± 500 kV Hybrid HVDC Breaker
10.1109/TPWRD.2023.3242266	A Mechanical-Electromagnetic Coupling Model of Transformer Windings and Its application in the Vibration-based Condition Monitoring
10.1109/TPWRD.2022.3145880	Dielectric design of ester-filled power transformers: AC stress analysis
10.1109/TPWRD.2022.3199999	Distribution Transformer Loading: Probabilistic Modeling and Diversity Factor

It is important for all interested individuals to follow the norm for writing papers as provided in IEEE. The link is <https://cmte.ieee.org/tpwr/>, particularly helpful is “How to Write for Technical Periodicals and Conferences”: <https://ieeauthorcenter.ieee.org/wp-content/uploads/How-to-Write-for-Technical-Periodicals-and-Conferences-1.pdf>

I would like to thank all of the reviewers who volunteered for this effort and donated their time. In particular, those CM and AP who have participated in the review process during 2022:

Barry Beaster
Enrique Betancourt
Gary Hoffman
Jerry R. Murphy
Jim Graham
Jim MBride
Ramsis Girgis
Rick Marek

Their important contribution helps to maintain the high standards for our papers and it gives back to the industry their expert knowledge.

I would like to encourage everyone associated with IEEE Transformers Committee activities to consider becoming a Reviewer. Who are interested, please, send me an e-mail to xmlopez@ieee.org specifying any “Specialty / Area of Expertise” of interest, such as:

Power Transformers
Instrument Transformers
Insulating fluids category
Insulation life
Audible Noise and Vibration
Transformer Modeling Techniques
HVDC Converter Transformers
Reactors
Monitoring
Design
Heating
Etc.

APPENDIX 9

IEEE Staff Update Presentation

IEEE STANDARDS ASSOCIATION - TRANSFORMER COMMITTEE

PE/ TRANSFORMERS ADMINISTRATIVE SUBCOMMITTEE
SPRING 2023

MALIA ZAMAN
M.ZAMAN@IEEE.ORG

PATRYCJA JAROSZ
P.JAROSZ@IEEE.ORG

AGENDA – SA UPDATES

- Staff Updates
- PAR/Standards Status Update
- Policy Updates/Reminders
- Reminder – SC policies expire 2024
- Mandatory Training
- Entity Process - Changes
- IEEE/IEC Dual Logo Status

- Annex : Past policy updates

STAFF UPDATES

Introducing new staff: Sharing the responsibility of PE/TR with PM

□ **Patrycja Jarosz**

□ p.jarosz@ieee.org

□ +1 732 465 780

Malia	Patrycja
Bushings	Dry Type
HVDC	Power Transformers
Insulation Life	Distribution
Instrument	Dielectric
Performance Characteristics	Insulation Llife
Standards	
STNP	

IEEE-SA UPDATES – PAR/STANDARDS STATUS

2023 - 24 PARS are expiring

- 14 are in ballot stage
- 11 in WG Development stage

2024– 15 PARS are expiring

- 6 PARs in SA Ballot stage
- 8 in WG development stage
- 1 PAR(s) are on the NesCom for Mar 29th (PAR extension)

1 is on RevCom Agenda for May. 2023

Expiring Standards in 2023

- 5 Stds. will become inactive
- Only 1 without PAR - IEEE 638

Expiring Standards in 2024

- 7 Stds. will become inactive
- Only 1 without PAR – IEEE C57.17

PE/TR STDS COMM P&PS DUE 2024

For Standards Committee

- [IEEE SA Baseline Policies and Procedures for Standards Development – Standards Committee \(DOC\)](#)
- [Standards Committee Baseline Instructions Template \(DOC\)](#)

For Individual Working Groups

- [IEEE SA Baseline Policies & Procedures – IEEE Standards WGs – Individual Method \(DOC\)](#)
- [WGs – Individual Method Baseline Instructions Template \(DOC\)](#)

AudCom Review Checklists (2020)

- [Standards Committee \(DOC\)](#)

[AudCom Baselines URL](#)

[Steps to upload the P&Ps to AudCom](#)

UPDATES ON THE MANDATORY WG CHAIR FUNDAMENTALS TRAINING

- ❑ As of 3/14/2023 it looks like 35% of the officers in SA have completed the training.
- ❑ The IEEE Standards Association Standards Board took action to modify the required training policy for IEEE SA Standards Committee Officers and Working Group Officers.

The following revisions are now in effect:

Understanding IEEE SA's Antitrust, Competition, and Commercial Terms Policies training shall be completed by Standards Committee/Working Group Officers within 90 days of appointment as such or by 31 December 2023, whichever is later.

Completion of *Working Group Chair Fundamentals* is now optional.

For the latest information concerning IEEE SA Required Training, please visit IEEE SA Volunteer Required Training Support Portal (<https://standards-support.ieee.org/hc/en-us/articles/7587458107540-IEEE-SA-Volunteer-Required-Training>) or contact your IEEE SA Program Manager.

- ❑ For issues or questions on the training contact; satrainingdevelopment@ieee.org

ADDING PES ENTITY PROPOSAL MANAGEMENT (EPM) COORDINATION IN SC POLICIES

When your Standards Committee (SC) policies and procedures come up for revision, the statement below should be added to ensure that coordination is needed between the SC and EPM for PES Committees Policies and Procedures.

For consistency purposes please add the following statement to clause 2.1 under Specific Responsibilities :

”Reviewing, accepting, and/or rejecting proposals assigned to the XXXXXX Standards Committee from the IEEE PES Entity Proposal Management (EPM) Committee “

CHANGE TO ENTITY MEMBERSHIP REQUIREMENTS

5.2.1.2 Membership Requirements for Standards Developed Under the Entity Method

Officers of IEEE standards working groups developing standards under the entity method shall be representatives of Entity Members of IEEE SA. Designees (those designated to manage the Standards Association ballot) in the IEEE Standards Association entity ballot process shall be representatives of Entity Members.

Every entity participating in an IEEE SA entity standards working group is required to be an Entity Member of IEEE SA to become a working group member or hold voting privileges.

*Entity nonmembers **may observe** IEEE SA entity standards working group meetings, **obtain read-only access** to IEEE repositories of IEEE SA entity standards working group **email communications** and documentation, and **may speak** at IEEE SA entity standards working group meetings at the discretion of the working group chair.*

STANDARDS BOARD BYLAWS – CLAUSE 5

ENTITY PARTICIPATION UPDATES

Previous Entity Participation:

- ☐ Can observe one meeting to see if interested in joining as a Corporate Member
- ☐ Corporate membership is needed to gain access to materials and participate."

Current Changes:

- ☐ Entity nonmembers may observe any Entity WG Meeting(s)
- ☐ At the discretion of the WG Chair
- ☐ Entity nonmembers may be able to speak
- ☐ Entity nonmembers may have read-only access to meeting materials

Update: Note – IEEE SA no longer provides Basic and Advanced Corporate Membership options. There is only a single IEEE SA corporate membership.

STANDARDS COMMITTEE REPRESENTATIVE & DRAFT DISTRIBUTION

- ❑ Availability of the Entity draft for the [Public Review Process](#) comments being readily available to the Standards Committee overseeing the project.
- ❑ The SCR (Standards Committee Representative) who has access to the draft is able to *share it with those in the Standards Committee with an interest* in the project.
- ❑ There is no cost associated with this. We have created the below FAQ to have guidance for the SCR. <https://standards.ieee.org/faqs/share/>

Can the Standards Committee Representative of an entity-based Working Group share the draft with participants in its Standards Committee?

Yes, the Standards Committee Representative should share the draft(s) with a subgroup of identified participants that have an interest in the scope of the Working Group within the Standards Committee.

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
 - Revision work discussed. No PAR submitted yet, IEC has issued questionnaire
 - 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
 - IEEE PC57.15/IEC 60076-21, Guide for the Application, Specification and Testing of Phase-Shifting Transformers
- **Standards Under Development**
 - **IEEE/IEC P63253-5713-8**, Standard Requirements for Station Service Voltage Transformers
 - PAR has been extended until 31 December 2023
 - IEC COMPLETED CDV is open and closes 9 December 2022
 - IEEE SA Ballot Group is formed, SA Ballot can open utilizing the CDV as the initial ballot draft
 - **IEEE/IEC P65700-19-03, Standard - Bushings for DC Application**
 - **PAR for the revision was approved September 2021**
 - **Draft development**

IEEE/IEC DUAL LOGO UPDATE (ACTIVE PROJECTS)

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

QUESTIONS?



ANNEX – PAST TRAINING

NEW WG CHAIR GUIDANCE

- **Welcome Kit and Next Steps Kits for new WG chair :**
 - Welcome Kit: Once a PAR is approved, package with training material and templates will be sent
 - Next steps Kit: Training on SA ballot and Comment resolutions material will be sent
- **IEEE Electronic Meeting Guide** : Guidance on Teleconference meetings
 - Direct Vote Live – Online voting mechanism, can create motions ahead of the meeting via a shared link, can provide a report and summary of the votes.
 - Demonstrations can be arranged

CONSENT TO IEEE PRIVACY POLICY

- IEEE SA has noted that many of the volunteers who are using iMeet Central have not consented to the IEEE Privacy Policy. If you have received such an email, please provide consent if you agree to the IEEE Privacy Policy by completing the following online form and indicating "Standards Development Activities and Tools" as the "Applicable Program":
<https://engagestandards.ieee.org/IEEE-SA-Privacy-Policy-Acceptance.html>.
- If you find that your iMeet account has been deactivated for not consenting to the IEEE Privacy Policy, please contact; **standards-support@ieee.org**
- Kindly please consent to the Privacy policy :
<https://engagestandards.ieee.org/IEEE-SA-Privacy-Policy-Acceptance.html>.
- A Validator Tool is available to check if the volunteers have consented to the IEEE Privacy Policy. IEEE SA will provide training for the WG officers to use the validator tool as needed. Once the training session(s) are set up, we will inform the committees.

CONTACT US!

Malia Zaman
Senior Program Manager
M.zaman@ieee.org
(732) 850 6608

Patrycja Jarosz
Program Associate
p.jarosz@ieee.org
(732) 465 780

APPENDIX 10

Meeting Planning

APPENDIX 11

Treasurer's Report

MEMORANDUM

March 10, 2023

To: Ed teNyenhuis, Chair
IEEE PES Transformers Committee

RE: IEEE PES Transformers Committee Treasurer's Report
Spring 2023 Meeting
(Reporting period 09/01/2022 to 01/31/2023)

Dear Ed,

The finances of the Committee are currently in moderate condition. As of January 31st (end of this reporting period), the checking account balance was \$102,773.10.

FYI: January 31st was essentially a "snap-shot in time" all income & most expenses were resolved from the previous Fall 2022 in person meeting and before we started incurring significant expenses for the Spring 23 Milwaukee Meeting.

Report period notes:

- The Spring 2022 Denver Meeting reports a loss of (\$54,789.43).
- The Fall 2022 Charlotte Meeting reports a preliminary gain of \$8,252.64.
 - Note, this meeting will ultimately report a loss of at least (\$1,245.08) as an additional charge was reported right after the period closing date.
- The contract for the Spring 2024 Vancouver meeting was executed in November 2022.
- The contract for Fall 2024 St Louis Meeting was executed in December 2022.
- The committee will be subject to a financial audit for 2022 as revenue and expenses exceeded \$250,000.

Based on budgetary projections, the committee's financial burden will significantly increase over the next two and a half years (S23, F23, S24, F24, and S25 meetings). The Committee will need to fully evaluate all meeting expenses and find ways to mitigate the impact of increasing costs for the membership.

See attached summary of the balance of this reporting period, and the previous periods.

Sincerely,

Troy Tanaka, Treasurer
IEEE PES Transformers Committee

IEEE PES TRANSFORMERS COMMITTEE
Treasurer's Report - Spring 2023
(for reporting period 09/01/2022 to 01/31/2023)

AA	Ledger Balance at Period Opening; 9/01/2022	\$ 85,599.22
	<u>Misc Income, not related to a specific meeting</u>	
B1	interest, approx 6 months	\$ 1,440.63
B2	misc income; shirt sales, CD-ROM sales, book sales, etc.	\$ 0.00
B	Total Misc Income, not meeting related	\$ 1,440.63
	<u>Misc Expenses, not related to a specific meeting</u>	
c1	Authorized.Net	\$ (260.00)
c2	Awards (not presented at any specific meeting)	\$ 0.00
c3	equipment purchases; projectors & cases, etc.	\$ 0.00
c4	technology; RFID tech, meeting app, WiFi equip, printers & ink, cables, etc	\$ 0.00
c5	conferences, JTCM, PES GM, remote meetings, etc.	\$ (1,529.69)
c6	other misc. expenses; shirts, audit, books, office supplies, name badges, etc.	\$ (971.25)
c7	memorial	\$ 0.00
C	Total Misc. Expenses, not meeting related	(\$2,760.94)
	<u>Spring 2022 Meeting</u>	
D1	Late Revenue, meeting registrations	\$ 0.00
D2	Misc late Revenue (incentives, late sponsor contributions, etc.)	\$ 0.00
D3	Late meeting expenses	\$ (6,974.25)
D	Total Late Income/(expenses), Spring 2022 Meeting	(\$6,974.25)
	Previous Revenue/Expenses Prior to 09/01/22	(\$47,815.18)
	Gain/(Loss) Spring 2022 Meeting	(\$54,789.43)
	<u>Fall 2022 Meeting</u>	
E1	Revenue, meeting registrations	\$ 270,902.92
E2	Revenue, coffee break sponsors	\$ 7,500.00
E3	Meeting expenses	\$ (259,894.09)
E	Profit/Loss between 09/01/2022 to 1/31/2023	\$18,508.83
	Previous Revenue/Expenses Prior to 09/01/22	(\$10,256.19)
	Profit/(Loss), Fall 2022 Meeting	\$8,252.64
	<u>Revenue/Expenses, Future Meetings</u>	
F1	Future Meeting Revenue between 09/01/2022 to 01/31/2023	\$ 730.00
F2	Future Meeting Expenses between 09/01/2022 to 01/31/2023	(\$2,635.37)
F	Total Meeting Revenue/(Expenses) for Future Meetings between 09/01/2022 to 01/31/2023	(\$1,905.37)
G	Net Income (loss), between Fall 2021 and Spring 2022 meetings (B+C+D+E+F)	\$ 8,308.90
H	Miscellaneous Adjustment	\$8,864.98
	Ledger/Bank Balance at Period Closing, 01/31/2023 (AA+G+H)	\$ 102,773.10

IEEE PES Transformer Committee

Spring 2022 - Denver Expenses/Revenue

Reporting Through 1/31/23

	EXPENSES	REVENUE
<u>Meeting Revenue</u>		
Revenue from Registrations		\$ 151,690.00
Break Sponsors		\$ 7,500.00
Hotel Credits		\$ 19,249.19
<u>Meeting Expenses</u>		
Food and Beverage	\$ (181,501.83)	
Audio Visual	\$ (22,322.75)	
Internet	\$ (3,125.00)	
Sunday Night Social	\$ (900.00)	
Wednesday Night Social	-	
Spouse Socials	\$ (2,105.25)	
Event Hub	\$ (1,000.00)	
Cvent	\$ (5,974.25)	
Awards	\$ (195.93)	
Quandel Hospitality LLC	\$ (9,583.27)	
Transportation	\$ (901.50)	
Shipping Costs	\$ (1,068.14)	
Credit Card Fees associated with Registration	\$ (4,550.70)	
Miscellaneous	-	
<u>Total Revenue/Expenses</u>	\$ (233,228.62)	\$ 178,439.19

<u>S22 Gain/Losses</u>	\$ (54,789.43)

IEEE PES Transformer Committee

Fall 2022 - Charlotte Expenses/Revenue

Reporting Through 1/31/23

	EXPENSES	REVENUE
<u>Meeting Revenue</u>		
Revenue from Registrations		\$ 245,515.00
Break Sponsors		\$ 7,500.00
Hotel Credits		\$ 25,387.92
<u>Meeting Expenses</u>		
Food and Beverage	\$ (177,797.42)	
Audio Visual	\$ (41,890.57)	
Internet	-	
Sunday Night Social	\$ (750.00)	
Wednesday Night Social	\$ (26,071.40)	
Spouse Socials	\$ (2,939.52)	
Event Hub	\$ (1,000.00)	
Cvent*	-	
Awards	\$ (371.76)	
Quandel Hospitality LLC	\$ (8,657.97)	
Transportation	\$ (3,150.00)	
Shipping Costs	-	
Credit Card Fees associated with Registration	\$ (7,365.45)	
Miscellaneous	\$ (156.19)	
<u>Total Revenue/Expenses</u>	\$ (270,150.28)	\$ 278,402.92

<u>F22 Gain/Losses</u>	\$ 8,252.64

*Cvent costs are not yet included in financials, as charge of \$(9,497.72) posted after closing of reporting period. Costs will be reflected in F23 minutes. If costs were included in this report, F22 would report a loss of **\$(1,245.08)**

ANNEX A Bushings Subcommittee

Milwaukee, Wisconsin, USA
March 22nd, 2023, 09:30AM Eastern

Chair (presiding officer):	Eric Weatherbee, PCORE Electric, Inc. / Hubbell Power Systems
Vice-Chair:	Scott Digby, Duke Energy
Secretary:	Fabien (Durand) Stacy, Hitachi Energy

A.1 Opening of the Meeting

A.1.1 Call to Order / Chairman's Opening Remarks

The Chair presented and reviewed the proposed agenda that was circulated to the SC members by the Chair prior to the meeting. There were no comments concerning the proposed agenda.

The Chair requested that each person use the microphone, state their name and affiliation when addressing the subcommittee.

The Chair reminded the WG chairs and secretaries that their meeting minutes need to be submitted to the Subcommittee officers no later than 15 days after their WG or TF meetings took place.

The Chair noted that the replacement for the AMS system should be ready for use by the Fall-2023 meeting, but for now attendance and attendance records are to continue to be managed manually.

The Chair noted that WG Chair training that had previously been mandatory is now voluntary, however the IEEE-SA Antitrust, Competition, and Commercial Temp Policies training unit is still mandatory, which is required to be completed by SC and WG officers within 90-days of appointment or by December 31, 2023 (whichever is later).

A.1.2 Reminders of IEEE policies

The requisite IEEE-SA information concerning the Call for Patents, the Copyright Policy, and the Individual Participation Guidelines had been transmitted to SG Members and Participants along with the meeting Agenda prior to this meeting.

A.1.3 New Members

It was reported that 4 new members had been accepted into the Subcommittee, each of whom were recognized. These new members are Kayland Adams, Sami Debass, Jeffrey Door, and Jerzy Kazmierczak.

A.1.4 Attendance

Participant rosters were circulated during the meeting for recording the meeting attendance. The Chair presented a list of the 77 current voting members to perform a quorum check. Quorum was achieved. Per subsequent review of the rosters the meeting had 119 attendees, of which 46 were members and 73 guests, with 12 guests requesting membership. Refer to [Appendix A](#) for meeting participants, their affiliation, and voting member status.

Table 1 – Meeting Attendance

Total	120
Members – Quorum Achieved	47
Guests	73
Guests Requesting Membership*	12

*Review of the historical attendance records indicate that of the 12 guests requesting membership, 6 meet the eligibility requirements (Raymond Frazier, Ronald Hernandez, Daniel Posadas, Zoltan Roman, Eric Schleismann, William Solano) and will be added to the membership roster effective at the next SC meeting.

A.1.5 Agenda Approval

As 46 of the 77 members were in attendance a quorum was achieved. There were no comments to the proposed agenda. A motion was made by Sanjib Som and seconded by Hugo Flores to approve the agenda as proposed. This motion carried by unanimous consent.

A.1.6 Previous Meeting's Minutes Approval

There were no comments to the minutes that had been posted. A motion was made by Fabian (Durand) Stacy and seconded by Hugo Flores to approve the minutes as posted. This motion carried by unanimous consent.

A.1.7 Status of Bushing Standards

The Chair presented the Standards Status Report for standards and guides under the Bushing SC, see Appendix B.

A.2 Working Group and Taskforce reports

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

No meeting was held due to the status of the balloting process. The WG Chair reported that balloting was complete and was going to RevCom for approval. The work of the WG is complete except for supporting the final editing that will take place with IEEE staff prior to publication.

A.2.2 WG C57.19.01-2017 – Dr. Shibao Zhang, Chair; **VACANT, Vice-Chair; **VACANT, Secretary****

No meeting held, with the current document having a 2027 expiration date. The WG Chair reported that after the call for comments made at the last SC meeting that some comments had been received. A motion was made by Sanjib Som and seconded by Kumar Mani to form a Task Force to prepare the PAR documentation to support the next revision cycle. The motion passed by unanimous consent.

A.2.3 WG PC57.19.02 Distribution Transformer Bushings – Steven Shull, Chair; Ed Smith, Vice-Chair, Rhett Chrysler, Secretary

The WG Chair was not present and there was not meeting of the WG this week. The document has completed the balloting process and is on the next RevCom agenda for approval. The work of the WG is complete except for supporting the final editing process that takes place with IEEE staff prior to publication.

A.2.4 IEC/IEEE 65700-19-03 Bushings for DC Application – Eric Weatherbee (IEEE) and Lars Jonsson (IEC), Co-Chairs; Sami Debass, Vice-Chair; J. Arturo Del Rio, Secretary

See complete WG minutes in Appendix C of this report.

The WG Chair reported that a complete reporting of WG meeting minutes is maintained by IEC, with the most recent IEC WG meeting having taken place February 7-8. It was reported that a third version

of the Draft document had been circulated for review. It was reported that there have been three (3) Task Forces under the WG: 1) Voltage source converters (work complete); 2) Altitude correction factors; and 3) Special tests. Editorial work is ongoing. The next IEC WG teleconference was scheduled for April 12-13.

A.2.5 WG C57.19.04-2018 – Scott Digby, Chair; **VACANT, Vice-Chair; Rich vonGemmingen, Secretary**

No meeting held as the latest revision was recently published and is not due for revision again until closer to the document's 2028 expiration date. The WG Chair noted that no comments regarding the document had been received thus far. The WG Chair requested that any comments regarding the current document be forwarded to him for consideration.

A.2.6 WG PC57.19.100-2012 – Tommy Spitzer, Chair; **VACANT, Vice-Chair; Fabian (Durand) Stacy, Secretary**

See complete WG minutes in Appendix D of this report.

The WG Chair reported that the Draft document was close to completion, and it was planned to solicit a vote of the WG for approving moving the document to Sponsor Ballot with the objective to go to ballot this year. It is expected that a PAR extension request will be likely, which would be its first PAR extension request.

PAR expires at the end of 2023.

A.3 External Liaison Reports

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

Mr. Mansuy was not in attendance but did submit a summary report, of which Art Del Rio provided a brief description. This summary report is included in Appendix E of this report. It was noted that the group discussing dimensional standards has reached some consensus, a draft of an application guide is being prepared, the document associated with maintenance is out for review and comment by the respective national committees with possible revision cycle forthcoming, and the document associated with DGA in bushings is in the process of being withdrawn and its content transferred to other documents.

A.3.2 WG PC57.160 Guide for PD Meas. in Bushings and Inst. Trans. – Thang Hochanh, Chair

The WG Chair reported that the document was currently going through the balloting process and that there were more than 500 ballot comments that the WG was working to resolve.

A.3.3 Amendment to IEEE 693, Recommended Practice for the Seismic Design of Substations - Durand Stacy

Mr. Stacy reported that the document was in the Ballot comment resolution stage of the process.

A.4 Unfinished Business

A.4.1 Venting/PD in OIP Bushings during FAT

This topic currently resides within the TF for Continuous Revision of Low Frequency Tests (under the Dielectric Test SC), with a Study Group having been formed under that TF formed to review the comments from a 2020 survey on the topic and make further recommendations. The Study Group included volunteers that had been solicited from within the Bushing SC. The Study Group facilitator, Ajith Varghese, provided a summary of the group's activities and status. A more detailed reporting of the Study Group would be included under the minutes of that Task Force so is not reiterated in detail in these minutes. The primary points of the report are as follows:

Text is in development for proposed text for inclusion within C57.12.90.

Egon Kirchenmayer with Siemens repeated a presentation that had been given to the Study Group and again at the Low Frequency TF regarding a bushing test procedure to simulate the cooldown behavior and bubble evolution. The Low Frequency TF Chair, who was present at this SC meeting, indicated that the complete presentation will be posted on the TC website under the Low Frequency TF.

There were some comments and discussion regarding this presentation. It was noted that other bushing manufacturers were reviewing this bushing testing in more detail in order to provide a more complete peer review. It was noted that this test procedure only applies to OIP bushings. It was noted that it would be expected that this would be a “type” dependent test, thus a special or type test and not a routine test. Much additional discussion regarding the test procedure, including its benefit and impact to the industry, is anticipated.

The SC Chair expressed appreciation to Siemens for their work on this bushing test procedure and the testing they had completed.

A.5 New Business

Cihangir John Sen made a presentation proposing two items to be considered during the next revision cycle of the applicable standard documents.

The first was suggesting reviewing the test voltages and PD level limits for Dry Type Condenser Bushings within C57.19.01, mainly to define such voltage levels and PD limits within Table-5 of that standard. The presentation noted that there are newer technologies being used (such as RIS, RIF, RIG, SDC, etc.) today that are not specifically addressed by the document but that his utility was increasing population of these type bushings. It was noted that these bushings behave differently than OIP bushings.

With preparations for the next revision cycle for C57.19.01 in process, the information will be forwarded to the Chair of C57.19.01 for consideration during that process.

The second item was to consider the addition of the word “concentrically” within the definition of “capacitance graded bushing:” within C57.19.00, such that it would read “A bushing in which metallic or nonmetallic conducting layers are concentrically arranged within the insulating material for the purpose of controlling the distribution of the electric field of the bushing, both axially and radially.” The presentation noted that non-concentrically arranged layers creates concentrated stresses within the insulation system that could potentially cause breakdown.

C57.19.00 has just been completed its recent balloting process, so, while the issue is not able to be considered for the current, approved Draft, the information will be forwarded to the WG Chair of that document for consideration during its next revision cycle.

A.6 Adjournment

A.7 After meeting note

Following the meeting Fabien (Durand) Stacy, Hitachi Energy, volunteered to fill the vacant role of Secretary, which was accepted, thank you Durand.

A.8 Next Meeting: Spring 2023, Milwaukee, Wisconsin - March 19 – 23, 2023

First Name	Last Name	Affiliation	Role
Mubarak	Abbas	Siemens Energy	Member
Kayland	Adams	Prolec-GE Waukesha	Member
Barry	Beaster	H-J Family of Companies	Member
William	Boettger	Boettger Transformer Consulting LLC	Member
David	Calitz	Siemens Energy	Member
Juan	Castellanos	Prolec GE	Member
Arup	Chakraborty	Delta Star Inc.	Member
Juan Carlos	Cruz Valdes	Prolec GE	Member
Samson (Sami)	Debass	EPRI	Member
J. Arturo	Del Rio	Siemens Energy	Member
Scott	Digby	Duke Energy	Vice-Chair
Huan	Dinh	Hitachi Energy	Member
Jeffrey	Door	H-J Family of Companies	Member
Evgenii	Ermakov	Hitachi Energy	Member
Marco	Espindola	Hitachi Energy	Member
Eric	Euvrard	RHM International	Member
Hugo	Flores	Hitachi Energy	Member
Jose	Gamboa	H-J Family of Companies	Member
Eduardo	Garcia Wild	Siemens Energy	Member
Bill	Griesacker	W. Griesacker & Associates Inc.	Member
Niklas	Gustavsson	Hitachi Energy	Member
Roger	Hayes	General Electric	Member
Egon	Kirchenmayer	Siemens Energy	Member
Kumar	Mani	Duke Energy	Member
Robert	Middleton	RHM International	Member
Emilio	Morales-Cruz	Qualitrol Company LLC	Member
Poorvi	Patel	Electric Power Research Institute (EPRI)	Member
Ulf	Radbrandt	Hitachi Energy	Member
Scott	Reed	MVA	Member
Diego	Robalino	Megger	Member
Amitabh	Sarkar	Virginia Transformer Corp.	Member
Ewald	Schweiger	Siemens Energy	Member
Cihangir	Sen	Duke Energy	Member
Sanjib	Som	Pennsylvania Transformer	Member
Thomas	Spitzer	City Transformer Service Co.	Member
Fabian	Stacy	Hitachi Energy	Member
Brad	Staley	Leeward Renewable Energy	Member
Troy	Tanaka	Burns & McDonnell	Member
Ajith	Varghese	Prolec-GE Waukesha	Member
Jason	Varnell	Doble Engineering Co.	Member
Dharam	Vir	Prolec GE Waukesha Inc	Member
Hugh	Waldrop	Memphis Light, Gas & Water	Member

David	Wallach	Duke Energy	Member
Eric	Weatherbee	PCORE Electric	Chair
Christopher	Whitten	Hitachi Energy	Member
Shibao	Zhang	PCORE Electric	Member
Peter	Zhao	Hydro One	Member
Alex	Alahmed	Evergy - Wolf Creek	Guest
Stephen	Antosz	Stephen Antosz & Associates, Inc	Guest
Elise	Arnold	SGB	Guest
Kush	Arora	Reinhausen	Guest
Christopher	Baumgartner	We Energies	Guest
EDWIN	BETANCOURT	SIEMENS ENERGY	Guest
Sanket	Bolar	Oncor Electric Delivery	Guest
Susan	Bonfiglio	Western Area Power Admin.	Guest
Jeremiah	Bradshaw	Bureau of Reclamation	Guest
Deniss	Carr	GE Grid Solutions	Guest
Juan Alfredo	Carrizales	Prolec GE	Guest
Nikolaus	Dillon	Dominion Energy	Guest
Jesse	Duffy	Nashville Electric Service	Guest
Sanford	Fong	Georgia Power	Guest
Raymond	Frazier	Ameren	Guest
Ronald	Hernandez	Doble Engineering Co.	Guest
Jean	Hernandez-Mejia	Georgia Tech NEETRAC	Guest
Christopher	Johnson	Oncor	Guest
Akash	Joshi	Black & Veatch	Guest
Nathan	Lange	Siemens Energy, Inc.	Guest
Ryan	Musgrove	Oklahoma Gas & Electric	Guest
Anthony	Natale	HICO America	Guest
Anastasia	O'Malley	Consolidated Edison Co. of NY	Guest
Rakesh	Patel	Hitachi Energy	Guest
Sanjay	Patel	SGB SMIT	Guest
Homero	Portillo	Advanced Power Technologies	Guest
Daniel	Posadas	Prolec St de CV	Guest
Thomas	Prevost	Weidmann Electrical Technology	Guest
Clemens	Reiss IV	Custom Materials, Inc.	Guest
Tim	Rocque	SPX Transformer Solutions, Inc.	Guest
Zoltan	Roman	GE Grid Solutions	Guest
Markus	Schiessl	SGB	Guest
Eric	Schleismann	Southern Company Services	Guest
Salahuddin	Shaikh	Hitachi Energy	Guest
Christopher	Slattery	FirstEnergy Corp.	Guest
Jason	Snyder	FirstEnergy	Guest
William	Solano	Reinhausen Manufacturing	Guest
Brian	Sparling	Dynamic Ratings, Inc.	Guest

Mike	Spurlock	Spurlock Engineering Services, LLC	Guest
Kyle	Stechschulte	American Electric Power	Guest
Charles	Sweetser	OMICRON electronics Corp USA	Guest
Matthew	Sze	OMICRON electronics Canada Corp.	Guest
Richard	vonGemmingen	Dominion Energy	Guest
Barrett	Wimberly	GE Grid Solutions	Guest
Fei	Yang	Hitachi ABB Power Grids	Guest
Kwasi	Yeboah	GE Energy Management	Guest
Malia	Zaman	IEEE	Guest
Christpoh	Kerschenbauer	Siemens Energy	Guest
Michael	Richardson	Ameren	Guest
Daniel	Crockett	Ameren	Guest
Rafal	Kowalski	Hitachi Energy	Guest
Jusuf	Krvavac	Sargent & Lundy	Guest
Oliver	Uhlmann	Reinhausen Canada Inc.	Guest
Mark	Newbill	Hitachi Energy	Guest
Toni	Mellin	Vaisala	Guest
Scott	Thomas	Hitachi Energy	Guest
Kevin	Mazzei	Black & Veatch	Guest
Bertrand	Poulin	Hitachi Energy	Guest
Monil	Patel	PG&E	Guest
Jacob	Thielbar	WAPA	Guest
Jose Luis	Machain	Prolec-GE	Guest
Marta	Munoz	Hitachi Energy	Guest
Vivek	Bhatt	Prole-GE Waukesha	Guest
Tiffany	Lucas	Prolec-GE Waukesha	Guest
Alaor	Scardazzi	Siemens Energy	Guest
Abdulmajid	Shaikh	Delta Star Inc.	Guest
Bernard	LaBean	Consumers Energy	Guest
Chris	Rutledge	Dynamic Ratings	Guest
Mark	Cheatham	GE	Guest
Jeremy	Sewell	Quality Switch	Guest
Alan	Sbravati	Hitachi Energy	Guest
Sam	Sharpless	Rimkus	Guest
Ethan	Steiger	Qualitrol	Guest

S23 Unofficial Standards Status Report

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	Document was approved Feb 16th, on to IEEE editors.
C57.19.01	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings	S. Zhang	2017 12/2027		Not Active
PC57.19.02	Standard for the Design and Performance Requirements of Bushings Applied to Liquid Immersed Distribution Transformers	S. Shull	New	2016 12/2022	Recirculation 4 passed balloting with 97% approval rate. RevCom will review at the May 15th meeting
P65700-19-03	IEC/IEEE International Standard -- Bushings for DC application	Eric Weatherbee	2014 12/2024	2021 12/2025	WG Draft Development - Mtg6 IEEE/IEC teleconference 4/12 - 4/13/23 8am EST, 1st draft 1st quarter of 2023
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		Not Active
PC57.19.100	IEEE Guide for Application of Power Apparatus Bushings	T. Spitzer	2012 12/2022	2019 12/2023	WG Draft Development

IEC/IEEE 65700_19_03 DC Bushings WG

Minutes of 2023 Spring Meeting
Tuesday, March 21st, 2023- 9:30 – 10:45 AM
HYATT Regency - Milwaukee (2) - Milwaukee, WI.

Eric Weatherbee - Chair
Vacant – Vice Chair **J. Arturo Del Rio – Secretary**

The WG met on Tuesday, March 21st, 2023, at 9:30 am in the Milwaukee room.

1. Welcoming and Call for Patents, Copyrights

- The meeting was called to order at 9:30 AM by the WG Chair.
- The call for potentially essential patents and copyrights issues was made. None were reported.

2. Quorum

- Total of 24 participants: 5 members and 19 guests.
- 5 Members of the 10 WG Members were present and quorum was not met. Agenda and previous meeting minutes could not be approved. Membership roster will be updated since 4 members have not attended the last 3 meetings.
- Sammy Debass has volunteered for the role of WG Vice Chair.

3. Liaison Update on Join Team activity

Full JMT meeting minutes to be posted in the Transformer Committee website.

Previous meeting: February 7th and 8th, 2023.

3rd Draft in the working group was submitted. Further topics addressed and will be discussed in the upcoming meeting.

TF1; review the draft CD re. Voltage Source Converter (VSC).

⇒ Finished, incorporated in the next CD.

TF2; review updates incl. examples re. altitude corrections and pollution parameters.

⇒ Some minor changes will be prepared for the next meeting.

TF3; review the draft CD re. the special tests section (even and uneven wetting) incl. reference documents.

⇒ Finished, incorporated in the next CD.

Editorial; Review the status of draft 3rd CD including, e.g.:

- Wording for tests.
- Replace oil with liquid.
- Remove the old reference to IEC 62199.

4. New business:

4.1 No new business or comments

Meeting was adjourned at 9:45 am

Next JMT JOINT IEC Meeting

Next meeting: April 12th and 13th, 2023, to be held by Zoom teleconference service on two consecutive days @ 14:00 to 16:00 (Central European Time).

Next IEEE WG Meeting

Fall 2023 – Kansas City (Westin at Crown Center), Missouri USA, Oct 22 – 26, 2023.

Respectfully submitted,

Chair: Eric Weatherbee (eweatherbee@ieee.org)

Secretary: Art Del Rio (a.delrio@ieee.org)

Attendance and status:

Status	First Name	Last Name	Affiliation
Guest	Mubarak	Abbas	Siemens Energy
Guest	Kush	Arora	Reinhousen
Guest	Eunyoung	Cho	HICO America
Guest	Samson	Debass	EPRI
Secretary	J. Arturo	Del Rio	Siemens Energy
Guest	Hassan	Elkassem	Siemens Energy
Guest	Eric	Euvrard	RHM International
Guest	Esseddik	Ferdjallah	Siemens Energy
Guest	Marc	Foata	Reinhousen
Guest	Sanford	Fong	GA Power
Guest	Juan Carlos	Hernandez-Mejia	GT-Neetrac
Member	Kurt	Kaineder	Siemens Energy
Guest	Jusuf	Krvavac	Sargent Lundy
Guest	Justin	Minikel	EATON Corporation
Guest	Verena	Pellon	FPL
Guest	Daniel	Posadas	Prolec Celeco
Member	Ulf	Radbrandt	Hitachi Energy
Guest	Brian	Sparling	Dynamic Ratings, Inc.
Member	Fabian	Stacy	Hitachi Energy
Guest	Oliver	Uhlmann	Reinhousen
Chair	Eric	Weatherbee	PCORE Electric
Guest	Elliot	White	SD Myers
Guest	Christopher	Whitten	Hitachi Energy

Guest	Malia	Zaman	IEEE-SA

The following members will be moved to Guest status as they have not attended the last 3 meetings.

First Name	Last Name	Company
Hugo	Flores	Hitachi Energy
Eduardo	Garcia Wild	Siemens Energy
David	Geibel	Retired
Peter	Werelius	Megger

IEEE C57.19.100

Guide for Application of Power Apparatus Bushing WG

Minutes of 2023 Spring Meeting

Monday, March 20th, 2023- 3:15-4:30 PM

HYATT Regency - Regency A (2) - Milwaukee, WI.

Tommy Spitzer– Chair

Durand Stacy – Secretary

The WG met on Monday, March 20th, 2023, at 3:15 PM in the Regency A (2) room.

5. Welcoming and Call for Patents, Copyrights

- The meeting was called to order at 3:15 PM by the WG Chair.
- The call for potentially essential patents and copyrights issues were made, and none were reported.

6. Quorum

- Total of 53 participants: 12 members and 41 guests.
- 12 Members of the 23 WG Members were present, but never more than 11 at one time so a quorum was not met. No official business was conducted.

7. Reconsolidation document

Document “Copy of CommentProposalForm Spring 2023 comments from Draft 5 R1.xls” was reviewed Much discueesion was had about the overload ability of bushing Durand Stacy offered to propose language for this. I have included it below for review

8. New business:

4.1 No new business or comments

Meeting was adjourned at 4:30 PM

Purpose language for overload of bushings.

“Per standard, bushings are not required to have an inherent overload capability. Any overload capability a bushing might have is individual to that bushings design and is not indicative of all bushing of that type of construction or even of that manufacturer across their product portfolio. Contact the bushing manufacturer with questions about a particular design. “

Next IEEE WG Meeting

Fall 2023 – Kansas City (Westin at Crown Center), Missouri USA, Oct 22 – 26, 2023.

Respectfully submitted,

Chair: Tommy Spitzer (t.spitzer@sbcglobal.net)

Secretary: Durand Stacy (durand.stacy@hitachienergy.com)

Attendance and status:

First Name	Last Name	Company	Status
Murarak	Abbas	Siemens Energy	Guest
Alex	Alahmed	Evergy	Guest
Barry	Beaster	H-J Family of Companies	Guest
Edwin	Betancourt	Siemens Energy	Guest
Vivek	Bhatt	Prolec GE	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Guest
Samson	Debass	EPRI	Guest
Yasiu	Demip	Prolec GE	Guest
J. Arturo	Del Rio	Siemens Energy	Member
Scott	Digby	Duke Energy	Member
Huan	Dinh	Hitachi Energy	Guest
Jeffrey	Door	H-J Family of Companies	Guest
Jesse	Duffy	Nashville Electric	Guest
Salih	Durmus	Siemens Energy	Guest
Hassum	Elkussem	Siemens Energy	Guest
Eric	Euvrard	RHM International	Member
Essedoik	Ferdjallah	Siemens Energy	Guest
Jose	Gamboa	H-J Family of Companies	Guest
Andrew	Gregory	ITEC	Guest
Jean	Hernandez-Mejia	GT-NEETRAC	Guest
Kurt	Kaineder	Siemens Energy	Guest
Chrisloph	Kerschamboer	Siemens Energy	Guest
Nathan	Lange	Siemens Energy	Guest
Junho	Lee	Hyundai	Guest
Soyoung	Lee	Hyundai	Guest
Mario	Locarno	Doble Engineering Co.	Member
Tiffany	LUCAS	Prolec GE	Guest
Robert	Middleton	RHM International	Member
Hugo	Murillo	H-J Family of Companies	Guest

Paul	Mushill	Ameren	Guest
Anthony	Natale	Hico America	Member
Vera	Pellon	Florida Power and Light	Guest
Damian	Podgrski	Sargent & Lundy	Guest
Daniel	Posadas	Prolec Cleco	Guest
Clemons	Reiss IV	Custom Materials Inc	Guest
Eric	Schleismann	Southern Company Services	Guest
Afrons	Schrammel	Siemens	Guest
William	Solano	Reinhausen	Member
Andy	Speegle	Entergy	Guest
Thomas	Spitzer	City Transformer Service Co.	Chair
Fabian	Stacy	Hitachi Energy	Secretary
Troy	Tanaka	Burns & McDonnell	Guest
Dervis	Tekin	Meramec Instrument Transformer Co.	Guest
Jacques	Vanier	Electro Composites (2008) ULC	Guest
Yves	Vermette	Electro Composites ULC	Guest
Loren	Wagenaar	WagenTrans Consulting	Guest
Eric	Weatherbee	PCORE Electric	Member
Christopher	Whitten	Hitachi Energy	Guest
Fei	Yang		Guest
Shibao	Zhang	PCORE Electric	Member
Peter	Zhao	Hydro One	Member
Richard	vonGemmingen	Dominion	Guest

SPRING 2023 MEETING OF IEEE TRANSFORMER BUSHINGS

Location: MILWAUKEE

Date: MARCH 19 – 23, 2023

BUSHINGS SUBCOMMITTEE WORKING GROUP AND TASK FORCE MEETINGS

Liaison Reports - IEC Bushing Standardization Activities

INTERNATIONAL ELECTROTECHNICAL COMMISSION TECHNICAL COMMITTEE No.36A: Insulated Bushing

MEETING TO BE HELD IN MILAN (ITALY), WITH REMOTE PARTICIPATION, ON THURSDAY JUNE 15, 2023

Potential New Work item Bushing dimensional standardization PWI 36A1-ED1 JWG 7	Update on the first Committee draft (CD) part1: LV and MV bushing and part 2: HV bushings
Potential New Work item Application guide for Bushings above 1 kV PWI 36-A2-ED1 JAHG8	Update on the work done by joint ad hoc group 8 and on the comments received after circulation of the doc 36A/223/DC
Revision of IEC 65700 Bushings for DC application	update about the status of the document revision in dual logo with IEEE
Maintenance Team for revision of IEC 60137 Bushings above 1kV.	The questionnaire 36A/224/Q has been sent to national committees for comments about the revision of the standard IEC 60137 A report on the project of revision will be presented.
Withdrawal of TR 61464 Guide for DGA in bushings	Transfer to IEC 60599 (guidance on the interpretation of dissolved and free gases analysis) and IEC 60475 (Method of sampling insulating liquids) the corresponding contents of IEC TR 61464 Report on the work done together with TC10

IEEE PES TRANSFORMERS COMMITTEE
DIELECTRIC TEST SUBCOMMITTEE

The meeting was held at the Hyatt Regency Hotel, Milwaukee, MI

Dielectric Tests Subcommittee		
Chair: Poorvi Patel	Vice-Chair: Thang Hochanh	Secretary: Diego Robalino
Room: Regency AB	Date: Wednesday, March 22nd, 2023	Time: 11:00 am to 12:15 pm
Total DTSC Members: 163	Members present at the meeting: 94	Attendance according to sign in sheet: 185
Guests present: 91	Membership requested: 23	Membership accepted: 15
Members moved to Guest Status: 27		

○ **Chair's Remarks**

The Chair welcomed members and guests to the Spring 2023 meeting in Milwaukee. First reminder for WG and TF Chairs and secretaries to submit their minutes as soon as possible. The SC has a deadline to submit minutes on May 05. Requested to include attendance list and submit reports to SC Secretary.

The Chairs introduced Patrycja Jarosz, the new Standards Program Coordinator for the DTSC. She will replace Malia Zaman in this activity, she will still support Patrycja with any questions regarding PARs, ballots, etc.

Regarding Leaders' Training, it has become optional and not compulsory as it was before. Antitrust policy training remains mandatory. Nonetheless, taking the training is recommended to get a global perspective of IEEE organization and processes.

The committee has not had an automated system (AM system) for quite some time but now a new "Committee Management System (CMS)" will maintain centralized rosters. An e-mail was sent to all Committee members and guests to create a profile with Member Planet (e-mail from Ed teNyenhuis) to create a profile by April 22nd.

<https://ieee.memberplanet.com/v2app#/member-registration/join>

● **ADCOM highlights**

DTSC Chair presented to the group the IEEE SA Copyright and Patent Policies with links to the IEEE SA website.

Status of Active Standards			
Project	Title	Valid until	PAR Status
C57.127	Guide for the Detection of Acoustic Emissions from Partial Discharges	2028	WG inactive – possible start soon a TF for review
C57.160	Guide for the Elec. Measurement of PD in HV bushings and Instrument Transformers	PAR extension for 1 year	PAR 2023
C57.113	Recommended practice for PD Measurement Power	In ballot process	PAR 2023
C57.98	Guide for Transformer Impulse Tests	2021 – PAR extension approved for 2 years	PAR 2024
C57.138	Recommended Practice for Routine Impulse Tests for Distribution Transformers	2026	PAR 2026
C57.161	Guide for DFR Measurements	2028	WG Inactive. possible start soon a TF for review
C57.168	Low-Frequency Test Guide	On ballot resolution – there is a PAR extension	PAR 2023
C57.12.200	Bushing Dielectric Frequency Response Guide (ENTITY WG)	2023 – Document recently published	WG inactive

Chair reminded the upcoming NesCOM/RevCom meeting dates and deadlines. This is a reminder that October 16 is the last day to submit a PAR extension for RevCom.

Standard Board Meeting	Submittal Deadlines
29 th of March 2023	
15 th of May 2023	4 th of April 2023
28 th of June 2023	19 th of May 2023

19 th of Septemeber 2023	11 th of August 2023
5-6 th of December 2023	16th of October 2023

○ **Secretary's Report**

SC Secretary requested unanimous approval to record the meeting for the sole purpose of minutes reporting. None are against it, and the meeting is recorded (only voice no video).

- From the last meeting, four (4) guests requested membership. Two were approved:
 - Zan Kiparizoski
 - Mama Mbouombouo
- Membership to DTSC was reviewed 2 out of 3 or 3 out of five. The same applies to keep member status in the SC.

For the meeting in Milwaukee, there are 163 members listed and a quorum requires 82 members in attendance. A list of members was presented to the audience to establish a quorum during this meeting. Looking at the list of members, we requested to stand up for headcount.

The headcount was completed with 92 members attending the meeting. **Therefore quorum was achieved.** The final review will be carried out against roster signatures.

○ **Quorum, Approval of Minutes, and Agenda**

Once quorum was established, Chairperson requested a motion to approve the agenda:

- Motion by Dan Sauer, second Evgenii Ermakov
- No objection to the unanimous approval of the agenda hence approved.

Chairperson requested a motion to approve the Fall 2022 minutes:

- Motion by Evgenii Ermakov, second Arup Chakraborty
- No objection to the unanimous approval of the agenda hence approved.

Attendance Summary

	By Roster
Total Attendees	185

Total # Of Members	163
Members Present	94
Quorum Present	YES (57.7%)

○ **SC Discussions and Motion passed.**

New Business:

1. C57.127 – Detlev Gross made a motion to open a PAR study group to the guide for the detection of Acoustic Emissions from Partial Discharges.
 - Tauhid Ansari second
 - No discussions and unanimous approval to start the PAR study group
 - First meeting to be held in Kansas City in the fall meeting
2. C57.161 – Evgenii Ermakov made a motion to open a PAR study group to the guide for DFR Measurements.
 - Diego Robalino second
 - No discussions and unanimous approval to start the PAR study group
 - First meeting to be held in Kansas City in the fall meeting

Old Business:

3. No old business

○ **Taskforce and Working Group Reports**

Reports are in the order presented during the meeting

TF: Core Ground and Winding Insulation Resistance

Chair: Diego Robalino

Secretary: Aniruddha Narawane

Minutes of Meeting held on 03/20/2023 from 4.45 pm CST to 6.00 pm CST

In-person Meeting: Gilpatrick meeting hall, Hyatt Regency, Milwaukee, WI.

1. The meeting was called to order at 4.45 pm with a welcome by Chairman Diego Robalino.
2. Chairman checked for any patents and copy rights and there were none.
3. Based on the initial check there was no quorum however due to the size of the meeting room (Max attendance allowed in the room was 30 and the number of members listed was 48) some of the attendees either had to stand outside the room or could not be accommodated due to which verification of member attendance was not possible. Chairman mentioned that the agenda, and minutes of the meeting from F22 will be presented at the F23 meeting for approval.
4. Chairman presented the general agenda, Scope of the task force and requested to discuss the Scope.
5. There were presentations from a member and chairman which illustrated the results of IR tests performed at various voltage levels, at various intervals, with different types of connections, and the differences in results were explained based on the variations of these parameters. There were discussions related to the results shown and also questions to clarify the duration of the test etc. Presentations uploaded to the website.
6. Chairman mentioned that the intention is to receive the data based on various sub-task groups formed.
7. There were suggestions that the TF should include recommendations about test conditions, the type of instruments recommended, and possibly some values for the IR based on best practices.
8. The meeting was adjourned at 5.45.

List Of Attendees

First Name	Last Name	<u>Email</u>
Kayland	Adams	Kayland.Adams@prolec.energy
Tom	Aikons	tom-aikons@vantransformer.com
Carlos	Alonso	cha258@nyu.edu
Mihir	Amin	mihiramin@eaton.com
Tauhid	Ansari	tauhid.ansari@hitachienergy.com
Stephen	Antosz	santosz@ieee.org
Daniel	Blaydon	dblaydon@ieee.org
William	Boettger	WEBOETTGER@aol.com
Lorin	Bratu	lorin.bratu@trnch-group.com

David	Calitz	david.calitz@siemens-energy.com
Alfredo	Carrizales	juanalfredo.carrizales@prolecge.com
Samson	Debass	sdebass@epri.com
Jesse	Duffy	jduffy@nespower.com
Samraghi	Dutta Roy	samraghi.dutta_roy@siemens-energy.com
Evgenii	Ermakov	evgeniiermakov@hitachienergy.com
Marco	Espindola	marco.a.espindola@hitachienergy.com
Raymond	Frazier	rfrazier@ameren.com
Loren	Gara	lgara@shermco.com
Rafael	Grajeda	rafaelgrajeda@eaton.com
Ravi	Gupta	ravi.gupta@megger.com
Roger	Hayes	roger.hayes1@ge.com
John	Herron	herronjph@aol.com
John	John	john_john@vatransformer.com
Zan	Kiparizoski	ZKIPARIZOSKI@HOWARD.COM
Fernando	Leal	ferleal@gmail.com
Kushal	Mahajan	kushalmahajan@eaton.com
Gabriel	Mamede	gabriel.mamede@siemens-energy.com
Kumar	Mani	kumar.mani@duke-energy.com
Lee	Matthews	lmattthews@ieee.org
Ismael	Naja	ismaelnaja@eaton.com
Aniruddha	Narawane	Aniruddha Narawane <anarawane@ieee.org>
Herman	Parralles	herman.parralles@prolec.energy
Poorvi	Patel	ppatel@epri.com
Rakesh	Patel	rakesh.patel@hitachienergy.com
Damian	Podgorski	damianpod@live.com
Diego	Robalino	diego_robolino@ieee.org
Tim	Rolque	tim.rolque@prolec.energy
Alberto	Sandoval	albertosandovalmoreno@eaton.com
Dan	Sauer	dmsauer@eaton.com
Cihangir	Sen	cihangir.sen@duke-energy.com
Abdulmajid	Shaikh	ashaikh@deltastar.com
Jaber	Shalabi	jshalabi@vantran.com
Chris	Slattery	cslattery@firstenergycorp.com
Jason	Snyder	jdsnyder@firstenergycorp.com
Muhammed	Sohail	muhammad.sohail@trench-group.com
Andy	Speegle	aspeegle@energy.com
Charles	Sweetser	charles.sweetser@omicronenergy.com
Eric	Tarango	etarango@olsun.com
Val	Tatli	valitatagm@gmail.com
Joseph	Tedesco	joseph.l.tedesco@hitachienergy.com
Samuel	Tekle	stekle@weg.net
Vijay	Tendulkar	vijaytendulkar@eaton.com

Eduardo	Tolcachir	ETOLCACHIR@TTE.COM.AR
Risto	Trifunoski	risto.trifunoski@trench-group.com
Ajith	Varghese	Ajith.Varghese@prolec.energy
Pragnesh	Vyas	pragnesh.vyas@sunbeltsolomon.com
David	Wallach	david.wallach@duke-energy.com
Kevin	Wirtz	kevin-wirtz@cargill.com
Jeffery	Wright	jwright@lublight.com
Anand	Zanwar	anand.zanwar123@gmail.com

TASK FORCE FOR REVISION TO LOW FREQUENCY DIELECTRIC TESTS

- **Milwaukee, Wisconsin Meeting – March 21, 2023, 1:45-3:30 pm CDT**

Chair: Ajith Varghese

Vice Chair: Markus Schiessl

Secretary: Jason Varnell

1. The meeting was called to order at 1:45 PM.
2. 88 individuals were in attendance. A quorum was achieved with 27 of 39 total members present. 19 individuals requested membership; however, only 7 were given member status based on attendance and participation and will be added after the S23 meeting. 10 Members that were not present had missed 2 out of the last three meetings and will be moved to guests after the S23 meeting, which means there will be 36.
3. A motion was made by Dan Sauer (Eaton Corp.) and seconded by Fernando Leal (Prolec-GE) to approve the Spring 2023 meeting agenda. There were no objections to unanimous approval of the agenda. A motion was made by Dan Sauer (Eaton Corporation) and seconded by Steve Antosz (Steve Antosz and Associates) to approve the Fall 2022 working group meeting minutes. There were no objections to unanimous approval of the Fall 2022 working group meeting minutes.
4. Factory PD Limits and Procedure Survey Results

The proposed changes from the Study Group on the factory PD procedure and limits were surveyed in the DTSC. The survey obtained 108 total votes, with a 70.4% approval rating. The comments received from the survey were reviewed. The surveyed text was the following:

1. Add a requirement for the measurement of PD at the Maximum System Voltage
2. PD limit 100 pC at Maximum System Voltage
3. Change the interval between measurements from 5 minutes to now 3 minutes during a 1-hour period

The task force reviewed the comments and unanimously approved the following text:

1. Immediately following the 1 h period, the voltage shall then be reduced to 1.05 X line to the ground value of the nominal system voltage (column 2, C57.12.00 Table 4) and held until a stable partial discharge level is obtained and the partial discharge level measured.
2. The magnitude of partial discharge level at 1.05 X Nominal System Voltage following the 1 h test period does not exceed 100 pC.

A motion was made by Dan Sauer (Eaton Corp) and seconded by Sanjib Som (PTTI) to take the approved text to the DTSC for a vote to include the text in the upcoming revision of C57.12.90. There were no objections to unanimous approval of the motion.

The task force unanimously agreed with the commenters to not change the requirement for the 5-minute measurement interval and therefore the 3-minute recommendation was removed. The task force unanimously agreed with the commenters to not add a requirement

to report the partial discharge measurement during the enhancement period. It was recommended to take these two items to the low-frequency test guide (PC57.168).

5. Task Force on PD Testing of Class 1 Power Transformers – Don Ayers

The task force met on Monday, March 20, 2023. There was no quorum. There was discussion on 7 proposals that came from the survey of the RLFT TF; however, more work will be required to provide text to the RLFT TF and the chair will work on reviewing the membership due to lack of participation. See TF minutes in Appendix A.

6. PD in Bushings During Factory Testing

- a. The chair reviewed the history of discussion which included a review of the 2020 DTSC survey on the subject of venting bushings. Additionally, it was reviewed that during the F22 meeting a study group was formed to come up with recommendations to address the concerns. The study group met on 1/27/2023, 2/10/2023, and 2/24/2023. Survey results are included in Appendix B of these minutes.
- b. The summary of the study group was reported by the chair, which included recommendations to add requirements to report on the certified test report if bushings were vented during factory acceptance testing. It was also recommended to clarify that the induced test shall be repeated entirely after venting bushings. Additionally, recommended changes to the wording were given to explain the phenomenon. Lastly, a type test for bushings to simulate cool down was discussed as a possibility.
- c. The following modified text to add to C57.12.90 was presented. The chair will work with a smaller group to improve the wording and grammar before going to the survey to the task force.

If the partial discharge exceeding agreed limits, 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.

Induce test shall be repeated entirely after venting and a note shall be added to the certified test report to indicate if any bushings were vented during Induce Test.

Note:

Partial discharge intended to be addressed by venting the bushing is the low energy discharge arising from partial vacuum created in expansion chamber or gas bubbles generated during the thermal test. Partial vacuum is created in the expansion chamber due to absorption of nitrogen or air into oil and gas bubbles are formed due to saturation of nitrogen. Partial discharges from these get resolved quickly on venting. If there are continuous gas bubble generation or elevated partial discharge remains after the venting, that may require additional investigation

If there are concerns of gas generation from Temperature rise test causing bushing failure during Impulse or Applied Voltage test, an induce test could be performed

before impulse for diagnostic purpose, but a complete Induce test shall be repeated as last dielectric test.

- d. A motion was made by Steve Antosz (Steve Antosz and Assoc.) and seconded by Subash Tuli to survey the TF with the proposed wording. There was unanimous approval to go to survey.
- e. Egon Kirchenmayer made a presentation on bushing test to simulate cool down behavior and bubble evolution, that could be considered as type or special Test.
 - i. Data presented is only for 3 bushings and doesn't show correlation if bushing that have PD and needed venting during induce test can be detected
 - ii. Many bushing manufacturers present during TF expressed concern that such a testing may need significant investment and resource and need more time review.
 - iii. No decision was made during the TF meeting on next steps with this. Presentation will be posted on website as reference material for future discussions.

7. Old business

- a. Jason Varnell (Doble Engineering) presented on contradictions on the induced overvoltage factor as presently written in C57.12.00 and C57.12.90. The task force agreed that the text should be cleaned up and a small study group was formed. The following volunteers agreed to participate: Jason Varnell (Doble Engineering), Steve Antosz (Steve Antosz Assoc.), Bill Griesacker (Griesacker and Assoc.), Salahuddin Shaikh (Hitachi Energy), and AbdulMajid Shaikh (Delta Star).

8. New business

- a. There was no new business.
9. The meeting was adjourned at 3:30 p.m. The next meeting will be in Kansas City, MO at the Fall 2023 Transformer Committee Meeting.

During the DTSC Ajith Varghese made the motion to approve the modifications in the text of C57.12.90 Section 10.8.2 according to what the WG approved during the session. The modified text was presented to the attendees in blue and yellow colors.

- Dan Sauer seconded the motion
- Open discussion. The attendees were asked for any objection to unanimous approval. None raised. **The motion was approved during the DTSC meeting.**
- Tauhid Ansari made a comment to support Ajith's proposal to study the pressurization of bushings during Induce Test/heat run test.
- No clear field correlation between the practice of venting the bushing and failure in the field.

Attendance Record

Role	First Name	Last Name	Company
Guest	Alex	Alahmed	alahmed.alex@gmail.com
Guest	Tauhid Haque	Ansari	Hitachi ABB Power Grids
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Member	Elise	Arnold	SGB
Member	Donald	Ayers	Ayers Transformer Consulting
Member	Christopher	Baumgartner	We Energies
Guest	Duvier	Bedoya	Hitachi ABB Power Grids
Guest	Edwin	Betancourt	Siemens Energy
Member	Daniel	Blaydon	Baltimore Gas & Electric
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	Christopher	Borck	Eaton
Guest	Michael	Botti	Hyosung HICO
Member	Jeffrey	Britton	Phenix Technologies, Inc.
Member	David	Calitz	Siemens Energy
Guest	Cole	Casey	Invenergy
Guest	Arup	Chakraborty	Delta Star Inc.
Guest	Scott	Digby	Duke Energy
Guest	Evgenii	Ermakov	Hitachi Energy
Member	Reto	Fausch	RF Solutions
Member	Hugo	Flores	Hitachi ABB Power Grids
Guest	Bruce	Forsyth	Bruce Forsyth and Associates PLLC
Guest	Raymond	Frazier	Ameren
Guest	Rich	Frye	Eaton
Guest	Renjie	Fu	ERMCO
Guest	Rob	Ghosh	General Electric
Member	Shawn	Gossett	Ameren
Member	Bill	Griesacker	Duquesne Light Co.
Guest	Detlev	Gross	Power Diagnostix Consult GmbH
Guest	Michael	Hall	Mid Central Electric
Guest	Jean Carlos	Hernandez	GT NEETRAC
Member	Sergio	Hernandez Cano	Hammond Power Solutions
Guest	Suramma	Hoffman	P&L
Member	Philip	Hopkinson	HVOLT Inc.
Guest	John	John	Virginia Transformer Corp.
Member	Stephen	Jordan	Tennessee Valley Authority
Member	Akash	Joshi	Black & Veatch
Guest	Thrinadha	Katapalli	Virginia Transformer Corp.
Guest	Jerzy	Kazmierczak	Hitachi ABB Power Grids
Guest	Egon	Kirchenmayer	Siemens Energy
Guest	Bernard	LaBean Jr.	Consumers Energy
Guest	Mathieu	Lachance	Omicron
Member	Mark	Lachman	Doble Engineering Co.
Member	Fernando	Leal	Prolec GE
Member	Weijun	Li	Braintree Electric Light Dept.
Guest	Gabriel	Mamede	Siemens Energy

Task Force on Revision of Impulse Tests

Chair: Sylvain Plante

Vice Chair: Daniel Sauer

The TF met on March 21st, 2023, from 08:00 am to 09:15 am. Twenty-two (22) members and seventy-eight (78) guests attended the meeting (see attached attendance list). Forty-five (45) Guests were attending for the first time the Task Force. Nine (9) guests requested membership but only 7 are eligible to have attended at least 2 of the last 3 meetings. After this meeting, seven (7) members have been moved to the guest list, not having attended 2 of the last 3 meetings. The meeting was chaired by Sylvain Plante, Chair of the TF. and Mr. Daniel Sauer was the vice-chair.

The meeting has been called to order by the Chair at 08:00 am.

Attendance has been recorded in the TF's attendance EXCEL spreadsheets and included in the annex.

Presentation of the new Chair, Sylvain Plante, that has been nominated by the Dielectric Tests Subcommittee Chair.

IEEE Patents and Copyright slides were presented. There were no comments or requests regarding Patents and Copyrights.

Required quorum was met, presence of at least 20 members was required, we had 22. The TF membership roster has been reviewed after the F22 virtual meeting and eleven (11) members who did not attend at least one of the last three meetings have been moved as guests. Three (3) new members have been added since the last meeting. Thirty-eight (38) guests not having attended the last five (5) meeting has been removed from the guest roster.

The meeting agenda has been approved unanimously. Motion has been made by Arup Chakraborty and was seconded by Tauhid Haque Ansari.

The F22 virtual meeting minutes have been approved unanimously. Motion has been made by Jim McBride and was seconded by Kris Zibert.

The first item of business was related to the results of a survey related to a proposal made by Daniel Sauer for modifications to clauses 10.3.2.2, 10.3.2.3, 10.4.4 and 10.4.5 of IEEE C57.12.90. This proposal is concerning lightning impulse tests on series, multiple, delta or wye connections for transformers rated 15 kV and below. The survey was sent to the DTSC members and guests (154 participants). The return rate was 24.7% and an approval rate of 100% was obtained. All received comments were reviewed and discussed. Comments were editorial.

A motion to accept the new text and sent it to the Working Group of the C57.12.90 has been made by Steve Antosz and second by Kris Ziebert. It has been unanimously approved.

The second item of business was related to the survey sent to the TF regarding the use of tolerances on the applied voltage during switching and lightning impulse test. This subject raises a lot of comments and discussion. The comment from the survey has been reviewed.

A motion to accept Kyle D Stechschulte's comment was made by Steve Antosz and was seconded by Daniel Sauer and has been rejected (4 in favor, 13 against, 3 abstain).

A motion to accept Stephen Antosz 's comment was made by Stephen Antosz and was seconded by Dan Sauer and has been rejected (6 in favor, 7 against, 6 abstain).

After a lot of discussion, a new text has been proposed:

“The basic rule for application of the tolerance on voltage crest value is that testing laboratories shall aim for the test value specified. If for any of the impulses of a test series, the actual measured voltage is lower than the required voltage crest value but within the allowable tolerance of $\pm 3\%$, the test shall be accepted as a valid test. For any required subsequent impulse on the same terminal, adjustments shall be made to aim for the specified test value.”

A motion to send to the DTSC for survey was made by Dan Sauer and was seconded by Stephen Antosz and has been accepted (18 in favor, 1 against, 0 abstain).

The revised proposal will be sent to the Dielectric Test Subcommittee for survey.

On new business, Ajith Varghese made a proposal for clause 10.2.4 of IEEE C57.12.90 regarding the tap selection during switching impulse test. His proposal was related to phase-to-phase voltage switching impulse withstand capability limitations for some on-load tap changers. Ajith explain the point, we had a few discussions, and we decide to send the proposal to survey, in order to leave time to members to study the question. The subject will remain on the agenda of the next meeting for discussion of the survey result.

The meeting adjourned at 09:15 am on March 21st, 2023.

The next meeting is planned to be held in Kansas City, Missouri, October 22-26, 2023.

Roster for the meeting			
Role	First Name	Last Name	Company
Member	Kayland	Adams	GE Prolec
Member	Tauhid Haque	Ansari	Hitachi Energy
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Donald	Ayers	Ayers Transformer Consulting
Guest	Christopher	Baumgartner	We Energies

Guest	Jason	Beaudoin	
Guest	Duvier	Bedoya	Hitachi Energy
Guest	William	Boettger	Boettger Transformer Consulting LLC
Member	Dominique	Bolliger, Ph.D.	HV TECHNOLOGIES, Inc.
Guest	Susan	Bonfiglio	
Guest	Christopher	borck	
Guest	Michel	Botti	
Guest	Jeffrey	Britton	Phenix Technologies, Inc.
Guest	Samuel	Brodeur	Hitachi Energy
Member	David	Calitz	Siemens Energy
Guest	camilo	casallas	
Member	Arup	Chakraborty	Delta Star Inc.
Guest	Vivian	Chan	
Guest	Ennyoung	Cho	
Guest	Jaroslav	Chorzepa	ABB Inc.
Guest	Rhett	Chrysler	
Guest	yasin	demir	
Guest	Paul	Dolloff	East Kentucky Power
Guest	Jeffrey	Door	The H-S Family of compangs
Guest	Marco	Ferreira	
Member	Hugo	Flores	Hitachi Energy
Guest	Raymond	Frazier	Ameren
Guest	Richard	Frye	EATON Corporation
Guest	Alireca	Gorzin	
Guest	Bill	Griesacker	W. Griesaker
Guest	Mike	Hall	
Guest	Gicyanni	Hernadez	
Member	Sergio	Hernandez Cano	Hammond Power Solutions

Guest	Derek	Hollrak	
Guest	saif	Hossain	
Guest	Nick	Jensen	Deltastar
Member	John	John	Virginia Transformer Corp.
Guest	Thrinadha	Katapalli	
Guest	Sheldon	Kenedy	Niagara Transformers
Guest	Qasim	Khan	
Guest	Zan	Kiparizoski	Howard Industries
Guest	Evan	Knapp	Eaton corp
Guest	Bernard	LaBean Jr	Consumer Energy
Member	Mark	Lachman	Doble Engineering Co.
Guest	Alexander	Lasysch	
Member	Fernando	Leal	Prolec GE
Guest	Moonhee	Lee	Hammond Power Solutions
Guest	Junho	Lee	
Guest	Soyoung	Lee	
Guest	Gabriel	Lopes Mamede	Siemens Energy
Guest	Kevin	Mazzei	Black & Veatch
Member	James	McBride	JMX Services, Inc.
Guest	Francis	Mills	
Guest	Martha	Minoz	
Guest	Juliano	Montanha	Siemens Energy
Member	David	Murray	Tennessee Valley Authority
Guest	George	Partyka	PTI Transformers
Guest	Harry	Pepe	Phenix Technologies, Inc.
Chair	Sylvain	Plante	Hydro-Quebec
Guest	Klaus	Pointner	Trench Austria GmbH
Member	Bertrand	Poulin	Hitachi Energy

Member	Jarrood	Prince	ERMCO
Guest	Ulf	Radbrandt	Hitachi Energy
Member	Leopoldo	Rodriguez	Transformer Testing Services LLC
Guest	Rodrigo	Ronchi	WEG Transformers USA Inc.
Member	Hakan	Sahin	Virginia/Georgia Transformer
Guest	Dinesh	sankarrakurup	
Member	Amitabh	Sarkar	Virginia Transformer Corp.
Vice-Chair	Daniel	Sauer	EATON Corporation
Guest	Alfons	Schrammel	
Guest	Cihangir	Sen	Duke Energy
Guest	abdulmajid	Shaikh	
Guest	Mike	Shannon	REA Magnet Wire
Guest	Ibrahim	Shteyh	Schneider électric
Member	Christopher	Slattery	FirstEnergy Corp.
Guest	Jason	Snyder	
Member	Sanjib	Som	Pennsylvania Transformer
Guest	Fabian	Stacy	Hitachi Energy
Member	Kyle	Stechschulte	American Electric Power
Guest	Andrew	Steineman	Delta Star Inc.
Guest	Oakes	Stephan	
Guest	Samuel	Tekle	
Guest	Jacob	Thielbar	
Guest	Scott	Thomas	Hitachi Energy
Member	Eduardo	Tolcachir	Tubos Trans Electric S.A.
Guest	Eduarda	Tolcachir	TTE
Guest	core	van dreel	
Member	Ajith	Varghese	SPX Transformer Solutions, Inc.

Guest	Camaeron	Vart	
Guest	Jos	Veens	SMIT Transformatoren B.V.
Guest	kannan	veeran	
Guest	Mike	Waldrop	
Member	David	Wallach	Duke Energy
Guest	Zack	Weiss	WEG Transformers USA Inc.
Guest	Kevin	Wirtz	
Guest	Fei	Yang	Hitachi energy
Guest	Anand	Zanwer	
Guest	Robert	Zaretsky	Sargent & Lundy
Member	Kris	Zibert	Allgeier, Martin and Associates
Member	Waldemar	Ziomek	PTI Transformers

Discussed in the DTSC meeting:

Proposed revised wording To send to C57.12.90 WG:

10.3.2.2 Windings for series, parallel or multiple connections

The windings shall be tested for all series, parallel and multiple connections. The test voltage for these conditions shall correspond to the BIL of the winding for that connection.

10.3.2.3 Windings for delta or wye connections

The three-phase transformer shall be tested on both delta and wye connections. The test voltage for each connection shall correspond to the BIL of the winding for that connection.

10.4.4 Windings for series, parallel or multiple connections

For high-voltage windings with series, parallel or multiple connections above 15 kV, the routine impulse test shall be conducted on each connection at its assigned BIL. For nominal system voltages of 15 kV and below, only the series connections shall be tested, unless tests on all connections are specified.

10.4.5 Windings for delta or wye connections

For high-voltage windings of three-phase transformers with delta or wye connection above 15 kV, the routine impulse test shall be conducted on each connection at its assigned BIL. For nominal system voltages of 15 kV and below, only the wye connection shall be tested, unless tests on all connections are specified.

Survey results: Revision of clauses 10.2.2.2 and 10.3.1.1 of IEEE C57.12.90

Modification regarding peak voltage tolerance during impulse

Date of issue: November 2nd 2022;

Closing date: December 31, 2022;

Number of surveys sent: 78 in TF Revision to Impulse Tests;

Number of surveys returned: Total: 18 returns, **(23%)**

Number of affirmative: 17 + 4 with comments **(94.4%)**;

Number of negative: 1 (5.6%);

Number of abstain: 0;

Comments received: See the following table.

Proposed text Add:

The basic rule for application of the tolerance on voltage crest value is that testing laboratories shall aim, whenever possible, for the test value specified. If for one of the impulses of a test series, the actual measured voltage is lower than the required voltage crest value but within the allowable tolerance of -3%, the test shall be accepted as a valid test. Appropriate steps shall be taken to make adjustments in order to aim for the specified test value.

Main highlights from the "Approve with comments" received:

a) *Comment from David Wallach, Chris Baumgartner and Polo Rodriquer Berlanga:*

Remove "Whenever is possible"

For both clauses, revise the last sentence for clarity as follows: For any required subsequent test, appropriate adjustments shall be made in order to aim for the specified test value.

b) *from Chris Baumgartner*

For both clauses, revise the last sentence for clarity as follows: For any required subsequent test, appropriate adjustments shall be made in order to aim for the specified test value.

TF Chair Observation: *To be discussed.*

Main highlights from the "Negative" received:

Comment from Kyle D Stechschulte

While I fully support the additional language and the intent, I cannot support the addition without defining the “appropriate steps” to aim for the test value. My suggested alternative would be if the voltage is not raised then the sequential test shot shall not be accepted. Here is my attempt to put my thoughts in words:

This additional language allows the test engineer to re-impulse due to an impulse generator error and still have a valid test as discussed in great detail during the TF meeting in the fall, however, does require the lab to make steps to increase the crest value or repeat impulses.

TF Chair Observation: *To be discussed.*

During the session TF Chair made a motion to send the text approved by the TF to the DTSC members showing the survey for revision of clauses 10.2.2.2 and 10.3.1.1 of IEEE C57.12.90. Second Dan Sauer. Third Ewald Schweiger

A little discussion initiated by Sanjib Som asking for the text to be presented during the session. As motion stated the request is to send the text approved so all members will have access to it.

Stephen Santoz suggested to survey the SC at the time of making the request, that way there is no second step. There is no need to show the text if survey is requested. DTSC leaders to discuss simplification of the process to survey the DTSC.

Detlev Gross suggests to consecutively survey the WG and later the SC to make sure approval is granted.

Finally motion is approved for TF Chair to survey the DTSC with the text surveyed and approved by the TF.

**WG to Investigate the Interaction between Substation Transients and Transformers in
HV and EHV Applications and Revision of C57.142**

Executive Ballroom (2), Milwaukee, WI, USA

Tuesday, March 21, 2023, 11:00 AM – 12:15 PM CDT

Chairman – Jim McBride

Vice Chair – Xose Lopez-Fernandez

Secretary – Tom Melle

- 1) Welcome and Chair's Remarks
- 2) Circulation of Attendance Sheets
- 3) IEEE Patent Policy Slides
- 4) Approval of Agenda and Minutes from Last Meeting
 - Member count was 22 of 24 required for quorum; therefore, **quorum was not achieved**, 66 Guests were present, Total Attendance – 88
- 5) C57.142 Ballot and Comment Resolution status – Jim McBride: presentation of open comments before the ballot resolution group (BRG) and discussion of several key comments (latest documents to be posted on WG website).
 - Comment on Page 16, Section 5: alignment of Guide with theory in IEC 62271-306, Section 16.4 (Tom Melle to review)
 - Comment - Page 20, Section 5.2: magnitude of re-ignition versus load power factor. The Chair provided examples of transients in shunt reactors illustrating 1.2 MV(pp) transients on transformer with 1.4 MV BIL (Jeffrey Britton to review)
 - Comment - Page 6, Section 3.4.1: discussion of transient recovery voltages (The Chair and Phil Hopkinson will review/survey with SWG BRG members and any experienced users or manufacturers)
 - Comment - Page 34, Section 7.6: de-energizing transformers with disconnectors (Bertrand Poulin suggested to leave the informative paragraph and insert a note that is can be dangerous to de-energize with switch)
 - Comment - Page 30, Section 7: mitigation method of "moving" the transformer's resonant frequency (such as with CCVT). A straw ballot was conducted and the results were split. Chair will conduct a survey of the BRG.
 - Comment - Page 33, Section 7.3: controlled switching to mitigate reignitions (the sentence will be rewritten to provide more clarity)
 - Comment – Page 5, Section 3.3: discussed "ground-fault neutralizer" terminology. Jeff Britton suggested coordination with WG C57.32. Tom Melle is Vice-Chair of that Standard and will coordinate matching terminology.
- 6) Mitigation Methods Task Force Update – Jim McBride / Phil Hopkinson
All prior mitigation methods proposed by the TF are included in the Guide. The TF will review/consider CCVT, Capacitive Shields and any other potential mitigation methods suggested by comment resolution.
- 7) New Business – Ajith Varghese suggested preparing an updated presentation for sharing with any liaison groups (SWG, CIGRE, PCS and the TC at-large).

- 8) Next Meeting (Fall 2023 – Kansas City, MO Oct 23, 2023)
- 9) Adjournment at 12:15 PM CDT

Meeting Attendance

Role	Last Name	First Name	Company
Chair	McBride	James	JMX High Voltage
Secretary	Melle	Thomas	HIGHVOLT
Member	Betancourt	Enrique	Prolec GE
Member	Boettger	William	Boettger Transformer Consulting LLC
Member	Britton	Jeffrey	Phenix Technologies, Inc.
Member	Garcia Wild	Eduardo	Siemens Energy
Member	Heiden	Kyle	EATON Corporation
Member	Hopkinson	Philip	HVOLT Inc.
Member	John	John	Virginia Transformer Corp.
Member	Joshi	Akash	Black & Veatch
Member	Kirchenmayer	Egon	Siemens Energy
Member	Li	Weijun	Braintree Electric Light Dept.
Member	Pointner	Klaus	Trench Austria GmbH
Member	Poulin	Bertrand	Hitachi Energy
Member	Roussell	Marnie	Entergy
Member	Sarkar	Amitabh	Virginia Transformer Corp.
Member	Sen	Cihangir	Duke Energy
Member	Sharp	Michael	Trench Limited
Member	Spurlock	Mike	Spurlock Engineering Services, LLC
Member	Varghese	Ajith	SPX Transformer Solutions, Inc.
Member	Vir	Dharam	Prolec-GE Waukesha
Member	Ziomek	Waldemar	PTI Transformers
Guest	Arritt	Robert	EPRI
Guest	Berube	Jean-Noel	Rugged Monitoring
Guest	Borck	Christopher	EATON Corporation

Guest	Casey	Cole	Invenergy
Guest	Chan	Vivian	Hitachi Energy
Guest	Cochran	Alex	U.S.E.
Guest	Craven	Michael	Qualus Corporation
Guest	Delgado Zamora	Gabriel	Invenergy
Guest	Digby	Scott	Duke Energy
Guest	Dillon	Nikolaus	Dominion Energy
Guest	Dolloff	Paul	East Kentucky Power
Guest	Ermakov	Evgenii	Hitachi Energy
Guest	Espindola	Marco	Hitachi Energy
Guest	FerdJallah	Esseddik	Trench Group
Guest	Frazier	Raymond	Ameren
Guest	Frye	Richard	EATON Corporation
Guest	Gamboa	Jose	H-J Family of Companies
Guest	Gara	Lorne	Shermco
Guest	Garcia	Miguel	Hitachi Energy
Guest	Gaytan	Carlos	Prolec GE
Guest	Gross	Detlev	Power Diagnostix Consultant
Guest	Harley	John	FirstPower Group LLC
Guest	Hernandez	JC	Georgia Tech - NEETRAC
Guest	Hoffman	Saramma	PPL Electric Utilities
Guest	Hossain	Saif	Trench Limited
Guest	Jarosz	Patrycia	IEEE SA
Guest	Katapalli	Thrinadha	Virginia Transformer
Guest	Kessler	Stacey	Ulteig Engineers
Guest	Khan	Qasim	Georgia Tech - NEETRAC
Guest	Klempner	Dmitriy	Southern California Edison
Guest	Knapp	Evan	EATON Corporation
Guest	Labean, Jr.	Bernard	Consumers Energy
Guest	Lachman	Mark	Doble Engineering Co.

Guest	Mani	Kumar	Duke Energy
Guest	Mendez	Omar	Prolec GE
Guest	Mohamed	Marian	XCEL Energy
Guest	Montanha	Juliano	Siemens Energy
Guest	Mushill	Paul	Ameren
Guest	Nims	Joe	Allen & Hoshall, Inc.
Guest	Parkinson	Dwight	EATON Corporation
Guest	Patel	Monil	PG&E
Guest	Pleceyic	Uros	Invenergy
Guest	Plisic	Goran	Siemens Energy
Guest	Radbrandt	Ulf	Hitachi Energy
Guest	Radu	Ion	Hitachi Energy
Guest	Rainbolt	Bradley	EATON Corporation
Guest	Restrepo	Ana	Hitachi Energy
Guest	Richardson	Michael	Ameren
Guest	Rocque	Tim	Prolec GE Waukesha
Guest	Ronchi	Rodrigo	WEG-Voltran
Guest	Schiessl	Markus	SGB
Guest	Shaikh	Salahuddin	Hitachi Energy
Guest	Shertukde	Hemchandra	University of Hartford
Guest	Shteyh	Ibrahim	Consultant
Guest	Shull	Stephen	BBC Electrical Service, Inc.
Guest	Stacy	Fabian	Hitachi Energy
Guest	Staley	Brad	Leeward Renewable Energy
Guest	Steineman	Andrew	Delta Star Inc.
Guest	Tolcachir	Eduardo	TTE
Guest	Vant	Cameron	Prolec-Waukesha
Guest	Veens	Jos	SMIT Transformatoren B.V.
Guest	Washburn	Alan	Burns & McDonnell
Guest	Weatherbee	Eric	PCORE Electric

Guest	Yun	Joshua	Virginia Transformer Corp.
Guest	Zaman	Malia	IEEE
Guest	Zhang	Shibao	PCORE Electric

WG – Guide for Dielectric Frequency Response on Bushings

- **Nothing to report – Work Completed and guide published**

TF – C57.138 – Recommended Practice for Routine Impulse Tests

Chair: Hakan Sahin
Secretary: David Wallace

Meeting Date: 21 March 2023 Time: 3:15 pm EST
Location: Milwaukee, WI, USA

Attendance: Members 10
Guests 27
Guests Requesting Membership 18
Total* 37

Meeting Minutes / Significant Issues / Comments:

Meeting was called to order at 3:15pm EST, March 21, 2023.

1. Administrative

- a. IEEE Patent Policy and Call for Patents
 - i. No comments from group.
- b. IEEE SA Copyright Policy
 - i. No comments from group.
- c. Review of agenda
 - i. No comments from group.
- d. Introductions of the attendees
 - i. Attendance sheets were passed out.
- e. Updated membership review and count for quorum
 - i. 30 people were in attendance with 9 members present. Quorum was not met
 - ii. Approval of the previous Fall_22 meeting's minutes approval will be done via email voting
 - iii. 18 attendees requested membership.

2. Old Business

- a. Old Business - Section 6.1.3: Effects of impulse generator loading, clarifications on Lg, and possible addition of a note about the effect of (Cpl) in the circuit – 1st slide

6.1.3 Effects of impulse generator loading

The impulse equipment used for routine impulse tests on distribution transformers must satisfy a different set of requirements than equipment used for design impulse testing in laboratory environments. Due to the large number of tests that must be performed on a typical production line and the short time allotted to the routine impulse test, impulse circuit parameters are generally not modified for each test. Therefore, the impulse circuit, as indicated in Figure 1, should be designed such that it will supply the proper impulse wave shape for all units to be tested without the need to make changes. A few guidelines on impulse circuit design for production line testing are given in the following paragraphs.

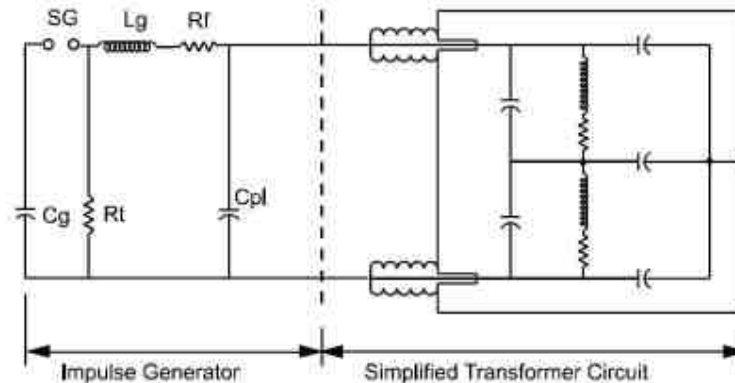


Figure 1—Typical lightning impulse circuit

Jim discussed his comments on clause 6.1.3. On note 1 – Recommend the L_g from the circuit. Note 2 should be included – manufactures should include a capacitive shunt for the current measurement.

b. Old Business - Possible revision of Figure 2

6.2 Transformer connections

The required connections for routine impulse tests on distribution transformers are defined in 10.4 of IEEE Std C57.12.90-2015. The impulse is applied to one end of a high-voltage winding while the other end of the same winding is connected to ground through a low-impedance shunt or wide-band current transformer (CT). All other windings, the isolated tank, and the core are grounded in a likewise manner. A typical connection meeting these requirements is shown in Figure 2. It should be noted that in Figure 2 only one terminal of the non-impulsed winding is connected to ground. The single ground connection to the non-impulsed windings enhances fault detection sensitivity. However, the voltage to ground on any non-tested terminal should not be allowed to exceed 80% of its assigned BIL. Additional low-voltage impulses may have to be applied to the terminal under test to enable the voltage transferred to non impulsed terminals to be determined. Recommended connections for various types of transformers and a few special considerations are provided in the following paragraphs. The voltage divider and digital impulse recorder connection, as shown in Figure 2 was omitted for clarity in Figure 3 through Figure 20.

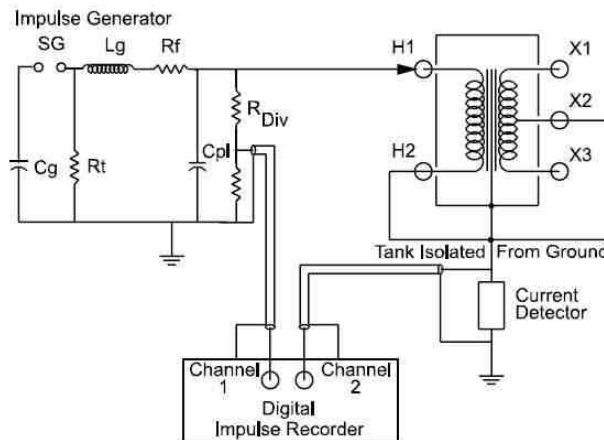


Figure 2—Typical transformer connection for routine impulse testing

Reto recommended remove resistive divider. Also change SG to IG

Jeff Britton recommended taking out the circuit showing both resistor and capacitor in the divider circuit and make it a simple divider circuit. Joshua suggested searching for any other changes similar to SG.

Dan Sauer commented on the Tank isolated from ground. This comment in the figure needs to be addresses. Steve, Jim and David also comments on this.

Possible modifications to Section 6.2.1 – Improved fault detection sensitivity. Need to add a note to make it message clear. Leave the figure as is.

Work will be done off line before the next meeting and circulated for email vote within members

3. Next meeting: Kansas City, KS USA 19-23, 2023 in Milwaukee, WI, USA.
4. Close of meeting
 - a. Meeting adjourned at 4:30pm EST

Submitted by: Hakan Sahin

Date: 4/8/23_____

Meeting Attendance:

Last Name	First Name	Company	Checkbox to request membership
Alonso	Mario	Georgia Transformers	
Avanoma	Onoma	MJC	X
Binder	Wallace	Consultant	
Bolliger	Alain	HV Technologies	
Carr	Deniss	GE	
Costa	Florian	Corimpex	X
CruzValdes	Juan Carlos	Prolec GE	
Davis	Eric	Burns and McDonald	
Diaz	Cesar	Eaton	
Dolloff	Paul	EKPC	
Door	Jeffrey	H-J	X
Elliott	William	Prolec GE	
Fausch	Reto	RF Solutions	
Flores	Hugo	Hitachi	
Frye	Rich	Eaton	
Frye	Richard	Eaton	
Garcia	Eduardo	Siemens Energy	X
Givaldo	Orlando	HJ Family	X
Hernandez	Giovannie	Virginia Transformers	
Hochanh	Thang	PowerTech	
Hopkinson	Phil	Hvolt	X
Jordan	Steve	TVA	
Lachman	Mark	Doble	

McBride	Jim	JMXHV	X
Morris	Tim	Walton EMC	
Murray	David	TVA	
Orozco	Polo	GE Grid Solutions	X
Parrales	Herman	Prolec GE	X
Patel	Poorvi	EPRI	
Plante	Sylvain	Hydro-Quebec	X
Posadas	Daniel	CELECO	X
Prince	Jarrold	ERMCO	
Sahin	Hakan	Virginia and Georgia Transformer	
Salinas	Fernando	Power Partners	X
Sauer	Dan	Eaton	X
Shalabi	Jaber	Vantran	
Slattery	Chris	First Energy	X
Snyder	Steve	Hitachi Energy	
Traut	Alan	Howard	X
Walker	David	MGM Transformers	X
Wallace	David	Mississippi State University	
Wimbery	Barret	GE	
Winter	Alexandar	Highvolt	
Yun	Joshua	Virgina Transformer Corp	X
Zhang	Shibao	Pcore	X

WG – Low Frequency Test Guide PC57.168

Milwaukee, WI. USA | March 21st, 2023 | 9:30 – 10:45 AM CDT

Chair: Dan Sauer
Vice Chair: -
Secretary: Sergio Hernandez

Meeting Attendance

The working group met at 9:35am. There were 57 attendees and 18/27 members present. Quorum was achieved.

Attendance

	Roster
Total Attendees	57
Total # Of Members	28
Members Present	18
Quorum Present	64%

Discussions

Administrative

1. IEEE Patent Policy and Call for Patents
 - a. No comments from group.
2. IEEE SA Copyright Policy
 - a. No comments from group.
3. Review and approval of agenda
 - a. No comments from group.
4. Attendance sheets were passed out.
5. Updated membership review and count for quorum
 - a. 57 people were in attendance with 18 members present. Quorum was met.
6. Approval of Agenda
 - a. Anonymously approved with no objections.
7. Approval of minutes
 - a. Anonymously approved with no objections.

Old business

8. PAR Extension approve – Good through Dec 2023.
 - a. Anonymously approved with no objections.
9. Ballot Results presentation
 - a. 95 out of 125 Ballots returned (76% return)
 - b. 86% Approval Rate
 - c. Abstentions – 3%
 - d. Disapprove with MBS – 12 Comments
 - e. Total Comments 287
10. Revision of Technical comments with WG
 - a. 16 technical comments reviewed.
 - b. 9 comments accepted and resolved
 - c. 5 comments rejected
 - d. Rest of the technical comments will be resolved with the BRG afterwards
 - e. Editorial comments will be resolved by chair.

New business

11. Recruit members for the BRG
 - a. Jeff Britton joins the existing BRG.
12. Adjournment
 - a. Meeting was adjourned at 10:50 am

Dan Sauer

Sergio Hernández

Attendee List:

Present members list		
First Name	Last Name	Company
Wallace	Binder	WBBinder Consultant
William	Boettger	Boettger Transformer Consulting LLC
Dominique	Bolliger, Ph.D.	HV TECHNOLOGIES, Inc.
Jeffrey	Britton	Phenix Technologies, Inc.
Eduardo	Garcia Wild	Siemens Energy
Detlev	Gross	Independent
Sergio	Hernandez Cano	Hammond Power Solutions
Moonhee	Lee	Hammond Power Solutions
Bertrand	Poulin	Hitachi Energy
Tim	Rocque	Prolec GE
Rodrigo	Ronchi	WEG-Voltran
Mickel	Saad	Hitachi Energy
Dan	Sauer	EATON Corporation
Mike	Shannon	REA Magnetic wire
Fabian	Stacy	Hitachi Energy
Janusz	Szczechowski	Maschinenfabrik Reinhausen
Ajit	Varghese	Prolec GE
Shibao	Zhang	PCORE Electric

Present guests list		
Mihir	Amin	Eaton
Robert	Apritt	EPRI
Barry	Beaster	H-J Family of companies
Edwin	Betancourt	Siemens Energy
Juan Alfredo	Carrizales	Prolec GE
Camilo	Casallas	TRENCH LTD
Cole	Casey	Invenergy
Mama	Dias	Eaton
Tony	DrBiase	Tempel Canada
Fernando	Duarte	EPRI
Lorne	Gara	Shermco
Eduardo	Gicaclir	TTE
Rafael	Grajeda	Eaton
Patrycia	Jarosz	IEEE SA
Gary	King	Howard Industries
Present guests list (cont'd)		
Evan	Knapp	Eaton
Mathieu	Lochawe	Omicron Electronics

Kushal	Mahajan	Eaton
Jim	McBride	JMX High voltage
Juliano	Montanha	Siemens Energy
Aniruddha	Narawane	Eaton
Mark	Newbill	Hitachi Energy
Rakesh	Patel	Hitachi Energy
Uros	Plecevic	Invenergy
Ion	Radu	Hitachi Energy
Alberto	Sandoval	Eaton
Abdulmajid	Shaikl	Delta Star
Hemchandra	Shertukde	University of Hartford
Jonathan	Snodgnass	Texas ARM University
Markus	Souller	Power Diagnostix Systems
Kyle	Stechschulte	AEP
Matthew	Sze	Omicron Electronics
Erik	Tarango	OLSUN Electrics
Val	Tatu	Powersmiths
Samuel	Tekle	WEG Transformers USA
Vijay	Tendulkar	Eaton
Alan	Traut	Howard Industries
Cameron	Vant	Prolec GE
Alan	Washburn	Burns & McDonnell

DTSC Chair asked to WG Chair if the task is still progressing within expected schedule. Dan indicated that a ballot resolution group is working already and should be no delays.

WG – Partial Discharge Test – C57.113 (A. Naderian)

No meeting. The report was carried out by DTSC Chair.

- The ballot for C57.113 has started and ends on March 23rd.
- Response rate only 40%
- 70 Ballot Group Members who have not voted to vote by March 23rd.

- **WG C57.160 PD in Bushings/PTs/CTs (T. Hochang)**

Chair: Thang Hochanh
Vice Chair: Reto Fausch
Secretary: vacant

Meeting Attendance

The working group met at 4:45pm CST . There were 44 attendees 30 Guest ;1 of the guests requested membership and 14 of 16 members present.
Quorum was achieved to conduct official business.

Discussions

- No essential patent claims or copyright violations noted.
- The Minutes of Spring 2022 meeting in Denver (CO) had been approved as written. Motion made by Zoltan Roman and second by Fabian Stacy.
- The Minutes of Fall 2022 meeting in Charlotte (NC) had been approved as written. Motion made by Dominique Bolliger and second by David Wallace.
- The Agenda was made by David Wallace and second by Marek Kornowsky.
- Discussion on item 1:
 - o The WG has proposed to remove the Figure 3 and Figure 4. Anything related to the capacitance C1, C2 and C3 has to be remove from the document. (page 24 clear). This come from a motion by Fabian Stacy and second by Shibao Zhang. The motion was accepted by the WG.
- Discussion on item 1:
 - o The following text: "In case of similar successive test objects, it is recommended to proceed to a new calibration verification before each test" (Clause 5.2), has been removed after a motion made by Shibao Zhang and second by Eric Weatherbee, was accepted by the WG. The revised document will be circulated to the WG for approval and balloting. In 2 weeks.

Old business: None

New business: None

Adjournment: Motion made by Marek Kornowsky and second by Fabian Stacy.

Total attendance: 44

Guests: 30

Members attending Spring 2023	
Dominique	Bolliger
Reto	Fausch
Detlev	Gross
Thang	Hochanh
Marek	Kornowski
Robert	Middleton
Daniel	Posadas
Zoltan	Roman
Steve	Snyder
Fabian	Stacy
David	Wallace
Eric	Weatherbee
Barrett	Wimberly
Shibao	Zhang

Members	16
Memb. Present	14
Quorum	87.5%

Requested Membership	
Risto	Trifunoski

Membership Req. 1

Attendance Spring 2023	
Lorin	Bratu
Deniss	Carr
Fabina	Cirino
Samson	Debass
Jeffrey	Door
Hassan	Elkasssem
Eric	Euvrard
Esseddik	Ferdjallah
Derek	Hellsch
Patricia	Jaurosz
Kurt	Kalweder
Mathiew	Lachance
Nathan	Lange
Mario	Locarno
Gabriel	Mamede
Scott	McCloskey
Rudolf	Ogajanov
Geaorge	Partyka
Poorvi	Patel
Caroline	Peterson
Sylvain	Plante
Andre	Rottenbacher
Alaor	Scardazzi
Markus	Soeller
Januz	Szczechowski
Matthew	Sze
Risto	Trifunoski
Subash	Tuli
Cameron	Vant
Elliot	White

At the end of the presentation by the TF Chair, a question came up asking about C3. What is that capacitance in the bushing? That is not a common reference for the committee members.

Thang Hochanh indicated that it was a motion accepted during the discussion many years ago.

It has been explained that it is for those bushings having a test and a potential tap.

Detlev Gross mentioned that the proposal is not focused on a unique/uncommon construction. Thang indicated he encountered several units in the field with such characteristic.

Shibao Zhang indicated that this may be a special design. IEEE describes clearly C1 and C2. A C3 is confusing for the group and the team will review this concept.

DTSC Chair requested to submit the resolved ballot comments to Patrycja to recirculate the ballot. It was suggested to submit the information directly to the IEEE Program Coordinator and no need for SC review.

WG – Transformer Impulse Test Guide PC57.98 (T. Hochang)

March 20th, 2023 | 3:15pm – 4:30pm CST

Chair: Thang Hochanh

Vice Chair: Reto Fausch

Secretary: vacant

Meeting Attendance

The working group met at 3:15pm CST

There were 36 attendees 26 Guest 1 of the guests requested membership and 9 of 12 members present. Quorum was achieved to conduct official business.

Discussions

- No essential patent claims or copyright violations noted.
- The Minutes of Fall 2022 meeting in Charlotte (NC) had been approved as written. Motion made by Dominique Bolliger and second by Fernando Leal.
- The motion to approve the Agenda was made by Fernando Leal and second by Polo Rodrigez.

Discussion on item 1:

- PICTURE TO ADD.
- It was requested to the members and guest, to provides oscillogram showing real life waveshape having a deep valley following the peak occurrence.

A group of volunteers have the following members:

- Waldemar Ziomek
- Abdul Shaikh
- Duvier Bedoya
- Fernando Leal

Are volunteers to write a clause, discussing on the item above. Recommendations will be made when a chopping is performed on these oscillograms.

Old business: None

New business: None

Adjournment: Motion made by Fernando Leal and second by Jim McBride.

Members attending Spring 2023	
Dominique	Bolliger
Arup	Chakraborty
Reto	Fausch
Sergio	Hernandez Cano
Thang	Hochanh
Fernando	Leal
Sylvain	Plante
Leopoldo	Rodriguez
Waldemar	Ziomek

Members	12
Memd. Present	9
Quorum	75.0%

Requested Membership	
Gabriel	Mamede

Attendance Spring 2023	
Alejandro	Ayala
Duvier	Bedoya
Wallace	Binder
Deniss	Carr
Vivian	Chan
Eunyoung	Cho
Daniel	Crockett
Roger	Dugan
Rich	Frye
Alireta	Gorein
Patrycja	Jarosz
Thrinadha	Katapalli
Evan	Knapp
Bernard	LaBean Jr
Ismael	Naja
Mark	Newbin
Lina	Sandsten
AbdulMajid	Shaikh
Jason	Snyder
Samuel	Tekle
Cameron	Vant
Alan	Washburn
Kannan	Veeran
Nick	Walder
Barret	Wimberly
Malia	Zaman

Liaison Report – HVTT (J. Britton)

Presented by Jim McBride

The HVTT Subcommittee held a hybrid meeting on January 11th, 2023 at the JTCM Meeting in Jacksonville, FL

- Active projects:
 - *WG P1122 - Standard for Digital Recorders for Measurements in High-Voltage and High-Current Impulse Tests*: 1st round ballot completed in August 2022. In comment resolution. PAR valid until end of 2023.
 - *WG P510 - Guide for Electrical Safety in High-Voltage Testing*: Near completion, a few WG comments still to be resolved prior to ballot. Expect to launch ballot before end of 2023. PAR valid until end of 2024.
 - *WG P4.1 - Guide for the Practical Implementation of IEEE Standard 4 on High-Voltage and High-Current Measurement Systems*: In draft development. PAR valid through 2023. Will require an extension to complete.
- *WG P454 - Guide for the Detection, Measurement and Interpretation of Partial Discharges*: Did not meet in January 2023, but will meet virtually on March 29th, 2023. In draft development. PAR valid through 2023. Will require an extension to complete.
- *WG P2426 - Guide for Field Measurement of Fast-Front and Very Fast-Front Overvoltages in Electric Power System*: HVTT Subcommittee comments to Draft 6.0 returned to Working Group on March 10th, 2023. HVTT will vote on whether to approve for ballot after next revision is received. PAR valid until end of 2023, and may require extension.
- *TF – Review of Title, Scope and Purpose for IEEE Standard 4* – The Task Force was unable to reach agreement on the Title, Scope and Purpose for the revision in the January meeting. Approval will be sought by electronic vote so that the PAR can still be submitted this year. We have approximately 12 areas for revisions at this time.
- If you are interested in participating in future meetings:
 - Contact Jim McBride (jim@jmxhv.com) or Jeff Britton (jbritton@doble.com) to begin receiving HVTT communications
 - The next HVTT Subcommittee Meeting is expected to take place in the fall of 2023, with the meeting date and location to be announced

At the end of the DTSC session, Secretary invited Alan Sbravati to explain the activities of the IEEE Electrical Insulation Conference. Alan Sbravati invited members of the SC to attend the Conference in June 2023 in Quebec City.

The chair requested a motion to Adjourn. Motion by Dan Sauer and Evgenii Ermakov second.

The meeting adjourned at 12:10 PM.

B6. List of Attendees to the DTSC meeting

Kayland	Adams
Alex	Alahmed
Tauhid Haque	Ansari
Stephen	Antosz
Elise	Arnold
Javier	Arteaga
Donald	Ayers
Christopher	Baumgartner
Jason	Beaudoin
Jean-Noel	Berube
Enrique	Betancourt
Vivek	Bhatt
Daniel	Blaydon
William	Boettger
Sanket	Bolar
Dominique	Bolliger
Susan	Bonfiglio
Jeremiah	Bradshaw
Jeffrey	Britton
Darren	Brown
David	Calitz
Deniss	Carr
Juan Alfredo	Carrizales
Camilo	Casallas
Juan	Castellanos
Arup	Chakraborty
Vivian	Chan
Craig	Colopy
Daniel	Crochett
Juan Carlos	Cruz Valdes
Roberto	Da Silva
Eric	Davis
Sami	Debass
Scott	Digby
Huan	Dinh
Jeffrey	Door

Jesse	Duffy
Samraghi	Dutta Roy
Evgenii	Ermakov
Marco	Espindola
Reto	Fausch
Marcos	Ferreira
Hugo	Flores
Bruce	Forsyth
Raymond	Frazier
Reajie	Fu
Miguel	Garcia
Eduardo	Garcia Wild
James	Gardner
Rob	Ghosh
Bill	Griesacker
Detlev	Gross
Attila	Gyore
Michael	Hall
John	Harley
Jack	Harley
Roger	Hayes
Ronald	Hernandez
Jean Carlos	Hernandez
Sergio	Hernandez Cano
John	Herron
Thang	Hochanh
Saramma	Hoffman
Ryan	Hogg
Saif	Hossain
Patrycja	Jarosz
Nicholas	Jensen
John	John
Christopher	Johnson
Akash	Joshi
Kurt	Kaineder
Jerzy	Kazmierczak
Sheldon	Kennedy
Stacey	Kessler
Rafal	Kowalski
Bernard	LaBean Jr
Andrew	Larison
Moonhee	Lee
Aleksandr	Levin

Weijun	Li
Luis	Machain
Tim-Felix	Mai
Kumar	Mani
James	McBride
Brian	McBride
Timothy	Menter
Kent	Miller
Francis	Mills
Juliano	Montanha
Emilio	Morales-Cruz
David	Murray
Ryan	Musgrove
Paul	Mushill
Ismael	Naja
Aniruddha	Narawane
Mark	Newbill
Rudolf	Ogajanov
Parminder	Panesar
Tyler	Parenti
Dwight	Parkinson
Poorvi	Patel
Rakesh	Patel
Monil	Patel
Verena	Pellon
Harry	Pepe
Sylvain	Plante
Klaus	Pointner
Bertrand	Poulin
Thomas	Prevost
Jarrold	Prince
Khan	Qasim
Ulf	Radbrandt
Ion	Radu
Scott	Reed
Michael	Richardson
Diego	Robalino
Tim	Rocque
Zoltan	Roman
Rodrigo	Ronchi
Mickel	Saad
Hakan	Sahin
Albert	Sanchez

Dinesh	Sankarakurup
Amitabh	Sarkar
Daniel	Sauer
Alan	Sbravati
Alaor	Scardazzi
Markus	Schiessl
Ewald	Schweiger
Cihangir	Sen
Abdulmajid	Shaikh
Salahuddin	Shaikh
Mike	Sharp
Stephen	Shull
Jonathan	Sinclair
Thomas	Sizemore
Christopher	Slattery
Steven	Snyder
Jason	Snyder
Sanjib	Som
Andy	Speegle
Mike	Spurlock
Fabian	Stacy
Brad	Staley
Andrew	Steineman
Chris	Steineman
Ethan	Sterger
Kerwin	Stretch
Charles	Sweetser
Janusz	Szczechowski
Matthew	Sze
Troy	Tanaka
Erik	Tarango
Valeriu	Tatu
Vijay	Tendulkar
Jacob	Thielbar
Scott	Thomas
Risto	Trifunoshi
Risto	Trifunoski
Cameron	Vant
Ajith	Varghese
Jason	Varnell
Dharam	Vir
Pragnesh	Vyas
David	Wallace

David	Wallach
Alan	Washburn
Joe	Watson
Eric	Weatherbee
Bruce	Webb
Zachery	Weiss
Drew	Welton
Daniel	Weyer
Joe	White
Christopher	Whitten
Barrett	Wimberly
Kevin	Wirtz
Jeffrey	Wright
Fei	Yang
Guang	Yuan
Malia	Zaman
Anand	Zanwar
Shidao	Zhang
Kris	Zibert
Waldemar	Ziomek

Annex C Distribution Subcommittee – Chair: Jerry Murphy

March 22, 2023

Milwaukee, WI USA

Chair: Jerry Murphy

Vice-Chair: Josh Verdell

Secretary: Martin Rave

C.1 General Opening

This meeting there were leadership changes within the subcommittee with Jerry Murphy taking over for Ed Smith as Chair, Josh Verdell moving to the Vice-Chair role, and Martin Rave graciously volunteering to take over as the subcommittee Secretary. Jerry opened the meeting welcoming everyone to the meeting and provided a Standards Report. To establish a quorum, a list of members was displayed, and a count of members was taken. We did have a quorum with 57 members in attendance by count of those identified on a slide presented in the meeting. Recorded attendance gave 146 in attendance and 67 members. List of attendees and affiliation attached below.

The agenda was reviewed, a motion was made to approve by Dan Sauer, seconded by Dan Mulkey, and approved by unanimous acclamation of the members in attendance.

The Fall 2022 meeting minutes were reviewed, a motion was made to approve by Tom Dauzat, seconded by Dan Sauer, and approved by unanimous acclamation of the members in attendance.

At this time, Josh Verdell reviewed the membership changes. A slide was presented welcoming the new member of the subcommittee before proceeding with the working group and task force reports.

C.2 Working Group and Task Force Reports

██████ C57.12.20 – Overhead Distribution Transformers – Al Traut

Al presented the following minutes from the working group meeting on March 20, 2023 at 11:00 a.m. with 76 in attendance.

1. Call to order
The meeting was called to order by the Chair (Al Traut) at 11:00AM on Monday, March 20, 2022.
2. Essential patent statement and copyright slides.
There was a call for essential patent by the Chair. There were none brought forward. The Chair announced if there was one to let the Chair or Vice Chair know. The IEEE copyright slides were shown to the WG.
3. Quorum Verification
A members list was displayed, and members were asked to complete digital poll. 33 of 47 members were present. A Quorum was declared.
4. Approval of agenda for this meeting

The Chair sent out the Agenda prior to the meeting for review. Agenda was approved without any opposition.

5. Approval of minutes of the previous meeting
The Chair sent out the minutes of the F22 minutes prior to the meeting for review. Minutes were approved without any opposition.
6. Chair Report
The active PAR expires in 2023. The formation of the Comment Resolution Committee was formed.
7. Old Business
 - A. Review of all 48 comments
 - B. Motion by S. Shull to accept comments as recommended by the Comment Resolution Group without modification. Seconded by E. Smith. Motion unanimously approved.
 - C. Reminder to the chair that a red-line copy of the draft must be submitted to RevCom.
8. New Business

No new business
9. Next meeting--date and location

Fall 2023 – Kansas City (Westin at Crown Center), Missouri USA, Oct 22 – 26, 2023**

10. Adjournment

The meeting was adjourned at 12:00 PM

Submitted by: Kendrick Hamilton

Date: 20/03/2023

ATTENDANCE

	Last Name	First Name	Role	Company
1	Ali	Rehan	Guest	Siemens Energy
2	Almeida	Nabi	Guest	Prolec
3	Arora	Kush	Guest	Reinhausen
4	Ayala	Alejandro	Guest	Power Partners
5	Biggie	Kevin	Guest	Weidmann Electrical Technology
6	Borck	Christopher	Guest	EATON Corporation
7	Brown	Darren	Member	Howard Industries
8	Brown	Chris	Guest	San Diego Gas & Electric
9	Callsen	Thomas	Member	Weldy-Lamont Associates
10	Chisholm	John	Guest	IFD Corporation
11	Chisholm	Matthew	Guest	IFD Corporation
12	Chrysler	Rhett	Member	ERMCO
13	Dauzat	Thomas	Member	General Electric
14	DeRouen	Craig	Member	ERMCO
15	Di Biase	Antonio	Guest	Tempel
16	Duarte	Fernando	Guest	EPR1
17	Garcia	Benjamin	Member	Southern California Edison
18	Garza	Hector	Guest	Orto de Mexico
19	Gaytan	Carlos	Member	Prolec GE
20	Ghafourian	Ali	Member	H-J Family of Companies
21	Gonzales	Michael	Guest	Southern California Edison
22	Grajeta	Rafael	Guest	EATON Corporation
23	Hall	Michael	Guest	Mid Central Electric
24	Hamilton	Kendrick	Secretary	United Standard Electric
25	Hampton	Kenneth	Member	Baltimore Gas & Electric
26	Issack	Ramadan	Member	American Electric Power
27	Khan	Qasim	Guest	Neetrac Georgia Tech
28	Knapp	Evan	Member	EATON Corporation
29	Kozer	Patrick	Guest	Northeast Transformer Services, LLC
30	Kozer	Gilbert	Guest	Northeast Transformer Services, LLC
31	Larison	Andrew	Guest	Hitachi Energy
32	Liegl	Angela	Member	EATON Corporation
33	Macias	Alejandro	Guest	Centerpoint Energy
34	Marquardt	Bryan	Guest	Cleveland Cliffs
35	McBride	Brian	Guest	Cargill, Inc.
36	Menter	Tim	Guest	Lincoln Electric System
37	Miller	Kent	Guest	T&R Electric Supply Co.
38	Minikel	Justin	Guest	EATON Corporation

x	Mai	Tim-Felix	Guest	Siemens Energy
38	Martinez	Joaquin	Guest	Siemens Energy
39	Menter	Tim	Guest	Lincoln Electric System
40	Miller	Kent	Guest	T&R Electric Supply Co.
41	Minikel	Justin	Guest	EATON Corporation
42	Morgan	Michael	Member	Duke Energy
43	Morris	Tim	Guest	Walton EMC
44	Munoz Molina	Martin	Guest	Orto de Mexico
45	Murillo	Hugo	Guest	H-J Family of Companies
46	Parkinson	Dwight	Member	EATON Corporation
47	Posadas	Daniel	Guest	Prolec
48	Radu	Ion	Guest	Hitachi Energy
49	Reepe	Robert	Member	Georgia Power Co.
50	Salinas	Fernando	Guest	Power Partners
51	Sampat	Mahesh	Guest	EMS Consulting Inc.
52	Sanchez	Albert	Member	Knoxville Utilities Board
53	Schneider	Jeffrey	Guest	Power Partners/Spire Power Solutions
54	Shannon	Michael	Member	Rea Magnet Wire
55	Shingari	Avijit	Guest	Pepco Holdings Inc.
56	Shull	Stephen	Member	BBC Electrical Services, Inc.
57	Siebert-Timmer	Audrey	Member	IFD Technologies
58	Silgado	Adrian	Guest	IFD Technologies
59	Smith	Edward	Vice-Chair	H-J Family of Companies
60	Stank	Markus	Guest	Maschinenfabrik Reinhausen
61	Tennant	Craig	Guest	H-J Family of Companies
62	Theisen	Eric	Member	Metglas, Inc.
63	Thibault	Michael	Member	Pacific Gas & Electric
64	Traut	Alan	Chair	Howard Industries
65	Valentin	Reinaldo	Member	Duke Energy
66	Van Horn	Jeremy	Member	IFD Technologies
67	Vartanian	John	Member	National Grid
68	Verdell	Joshua	Member	ERMCO
69	Vyas	Pragnesh	Member	Sunbelt-Solomon Solutions
70	Webb	Bruce	Member	Knoxville Utilities Board
71	Wilks	Alan	Member	Consultant
72	Zaman	Malia	Guest	IEEE SA

39	Moreno	Andre	Guest	Siemens Energy
40	Morgan	Michael	Member	Duke Energy
41	Mulkey	Daniel	Member	Mulkey Engineering Inc.
42	Munoz Molina	Martin	Guest	Orto de Mexico
43	Naja	Ismael	Guest	EATON Corporation
44	Parenti	Tyler	Guest	Cargill, Inc.
45	Parkinson	Dwight	Member	EATON Corporation
46	Peterson	Caroline	Guest	XCEL Energy
47	Posadas	Daniel	Member	Prolec
48	Prince	Jarrold	Member	ERMCO
49	Radu	Ion	Member	Hitachi Energy
50	Rave	Martin	Member	ComEd
51	Reepe	Robert	Member	Georgia Power Co.
52	Rush	Mason	Guest	Central Moloney, Inc.
53	Salinas	Fernando	Guest	Power Partners
54	Sanchez	Albert	Member	Knoxville Utilities Board
55	Sandoval	Alberto	Guest	EATON Corporation
56	Sewell	Russ	Guest	Quality Switch
57	Shannon	Michael	Member	Rea Magnet Wire
58	Shingari	Avijit	Guest	Pepco Holdings Inc.
59	Shull	Stephen	Member	BBC Electrical Services, Inc.
60	Smith	Edward	Vice-Chair	H-J Family of Companies
61	Snyder	Steven	Guest	Hitachi
62	Spaulding	James	Guest	Fort Collins Utilities
63	Stankes	Dave	Guest	3M
64	Stretch	Kerwin	Guest	Siemens Energy
65	Sullivan	Christopher	Guest	Westmark Partners
66	Syed	Ali	Guest	Comed
67	Thibault	Michael	Member	Pacific Gas & Electric
68	Traut	Alan	Chair	Howard Industries
69	Valentin	Reinaldo	Member	Duke Energy
70	Vartanian	John	Member	National Grid
71	Verdell	Joshua	Member	ERMCO
72	Vyas	Pragnesh	Member	Sunbelt-Solomon
73	Webb	Bruce	Member	Knoxville Utilities Board
74	Wilks	Alan	Member	Consultant
75	Zaman	Malia	Guest	IEEE SA
76	Zuiderveen	Thomas	Guest	IFD Technologies

██████ 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 March 21, 2023 at 8:00 a.m. in with 69 in attendance.

1. Dan Mulkey called the meeting to order at 8:01 AM CST. Group introductions were made.
2. Opening remarks and announcements
 - a. AMS system has been discontinued. Paper rosters were circulated.
 - b. Luke Grandbois and Matthew Chisholm assisted Dan Mulkey with secretary and vice president duties as both Jeremy Van Horn and Audrey Siebert-Timmer could not make the meeting.
3. Dan Mulkey reviewed IEEE SA Copyright Policy and Essential Patent Claims. No issues were raised.
4. Membership changes were noted:
 - a. Added: Craig Derouen
 - b. Removed: Said Hachichi (deceased)
5. Quorum was verified. The working group consisted of 58 members, requiring 30 for quorum. 34 members were counted at the start of the meeting. Attendance records later confirmed 40 members attended.
6. Dan Mulkey requested approval of the Spring 2023 Agenda with the correction of C57.12.29 to C57.12.32. Paul Chisholm made a motion, second by Jerry Murphy. Agenda was unanimously approved.
7. Dan Mulkey requested approval of the Fall 2023 Minutes. Jerry Murphy made a motion, second by Steve Shull for approval of the minutes. Minutes were unanimously approved.
8. Status of Standards:
 - a. C57.12.28 Standard for Pad-Mounted Equipment – Enclosure Integrity, Published July 15, 2014
 - i. Expires: 12/31/2024
 - ii. PAR expiration: 12/31/2024
 - iii. Status: Draft 5 in ballot process
 - b. C57.12.29 Standard for Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published August 8, 2014
 - i. Expires: 12/31/2024
 - ii. PAR expiration: 12/31/2024
 - iii. Status: Draft 5 in ballot process
 - c. C57.12.30 Standard for Pole-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published March 4, 2021
 - i. Expires: 12/31/2030
 - d. C57.12.31 Standard for Pole Mounted Equipment – Enclosure Integrity, Published February 26, 2021
 - i. Expires: 12/31/2030
 - e. C57.12.32 Standard for Submersible Equipment – Enclosure Integrity, Published Aug 8, 2019

- i. Expires: 12/31/2029
- 9. Old business:
 - a. Dan Mulkey reviewed status of standards.
 - i. Draft 5 of C57.12.28 and Draft 5 C57.12.29 are in the ballot process.
 - b. Dan Mulkey reviewed the revision plan for C57.12.32 submersible standard.
 - i. Request PAR after this meeting, this will give us 6 meetings before we begin ballot Oct 2026 with the goal of finishing ballot in 2027.
 - ii. Michael Thibault made a motion, second by John Vartanian, to add “i) Submersible Switch” to 1.1 Scope. Motion passed without opposition.
 - iii. Discussion around “h) Submersible Control Box”. Group agreed to review the language and decide if battery or communication box is required to be called out or if it is already covered.
 - iv. Thomas Dauzat made a motion to add “without cathodic protection” to the last line of 1.1 Scope. The motion received no second and was tabled.
 - v. Comment from Ali Garza: suggested that 1.1 Scope list items should reference the associated IEEE standard; Jerry Murphy stated bibliography covers most, if not all, of the references on the list. No motion made.
 - vi. Motion by Al Traut, second by Josh Verdell, to remove submersible switchgear as they are covered by another standard: C37.75. Motion passed without opposition.
 - vii. Question posed by Brian Kaplonski: should we remove language from standard and reference C37.75 in the bibliography (specifically switch and switchgear)? No decision made.
 Note PC37.75 Draft Standard for Pad-Mounted, Pole-Mounted, and Submersible Switchgear Enclosures and Associated Control Enclosures - Coastal and Non-Coastal Environmental Integrity is presently in re
 - c. Dan Mulkey reviewed the revision plan for C57.12.30 and C57.12.31 pole-mounted standards.
 - i. Request PAR Oct 2026, this will give us 5 meetings before we begin ballot Oct 2029 with the plan of finishing ballot in 2030.
 - d. Dan Mulkey reviewed proposed revisions to the C57.12.32 scope and purpose for C57.12.32 submersible standard.
 - i. Scope modification: added “enclosure” prior to integrity
 - ii. Purpose modification: added “and positive safety features”
 - e. Justin Minikel presented Lamp Selection Taskforce findings where they reviewed bulb / lamp selection.
 - i. UVA vs UVB:
 - 1. UVA longest wavelength, lowest energy, 95% of terrestrial exposure
 - 2. UVB highly damaging wavelength, 5% of terrestrial exposure
 - ii. Data review:
 - 1. F16 / S17 Presentation by PPG: UVA equally capable of weeding out poor performing systems compared to UVB

2. F17 Presentation by PPG and Sherwin Williams: most coatings maintain > 70% gloss retention after 1200 hour UVA exposure, UVA still captures the poor performers
3. Additional supporting data Eaton 3-year weather study (2017-2021): supports previous work
- iii. Other considerations:
 1. The SCAB corrosion test should continue to use UVB pre-aging step until a suitable alternative test method can be defined.
 2. UV requirements may need to be modified in C57.12.32 as vaults have different terrestrial exposure levels.
- iv. Taskforce recommendation: change preferred test method to ASTM G154, Cycle 1 (UVA-340) which more closely matches real world sunlight exposure. Proposed two options for test criteria:
 1. Option 1: 1000 hrs, >70% gloss retention (loss of gloss not exceed 30%)
 2. Option 2: 1500 hrs, >50% gloss retention (loss of gloss not exceed 50%)
- v. Taskforce recommendation: keep historical test method as optional as it is still used for the SCAB test.
 1. ASTM C154, Cycle 2 (UVB-313), irradiance modified to 0.48 W/m².
 2. 500 hrs exposure, > 50% gloss retention (loss of gloss not exceed 50%)
- vi. Group discussion:
 1. Justin Minikel is working to make the findings of NEETRAC's research available to the Working Group.
 2. Tiffany Lucas noted that if the standard states that there are multiple acceptable testing options, certain customers will request that all testing options be performed, which will create additional work for transformer manufacturers.
 3. Thomas Dauzat referenced ASTM standards related to paint tests:
 - a. G154 → simulator
 - b. G155 → bulb standard
 - c. D7869 → automotive / aerospace reference
 4. Brian Kaplonski proposed that the Working Group should have a goal regarding what we are working towards with the information presented by Justin Minikel. No decision was made.

10. New business:

- a. Motion by Martin Bachand, second by Justin Minikel, to create a taskforce to investigate the impact test (reference C57.12.28 and C57.12.29) and provide some direction to the Working Group. Motion passed with no opposition.
 - i. Taskforce Chair: Justine Minikel (Eaton Corporation)
 - ii. Taskforce Members: Martin Bachand (Cloverdale Paint), Nabi Almeida (Prolec GE), Mike Zarnowski (Carte International), Daniel Mulkey (Mulkey Engineering Inc.)
- b. Jim Spaulding inquired if there is a reference for fire protection in this standard. Group discussed that C57.12.28 includes fire resistance in clause 4.1.9.

1. Next meeting: October 24, 2023 in Kansas City, MO, USA

- c. The following attendees requested membership and will be added to membership for the Fall 2023 meeting: **Nabi Almeida, Thomas Callsen, Gilbert Kozer, Patrick Kozer, Tiffany Lucas, Mason Rush, Fernando Salinas**

2. The meeting was adjourned at 9:07 AM CST.

Submitted by: Luke Grandbois

Date: March 21, 2023

List of Members:

Martin Bachand (Cloverdale Paint Inc.)
Darren Brown (Howard Industries)
John Chisholm (IFD Technologies)
Rhett Chrysler (ERMCO)
Douglas Craig (Richards Manufacturing Co.)
Thomas Dauzat (AEP)
Benjamin Garcia (Southern California Edison)
James Gardner (Prolec GE)
Carlos Gaytan (Prolec GE)
Ali Ghafourian (H-J Enterprises, Inc.)
Kenneth Hampton (Baltimore Gas & Electric)
Ramadan Issack (American Electric Power)
Gary King (Howard Industries)
Brian Klaponski (Carte International Inc.)
Andrew Larison (Hitachi Energy)
Alejandro Macias (CenterPoint Energy)
Justin Minikel (EATON Corporation)
Michael Morgan (Duke Energy)
Daniel Mulkey (Mulkey Engineering Inc.)
Jerry Murphy (Reedy Creek Energy Services)
Dwight Parkinson (EATON Corporation)
Vinay Patel (Consolidated Edison Co. of NY)
Ion Radu (Hitachi Energy)
James Ratty (Electronic Technology Inc.)
Martin Rave (ComEd)
Robert Reepe (Georgia Power Co.)
Pedro Salgado (Electronic Technology Inc.)
Avijit Shingari (Pepco Holdings Inc.)
Stephen Shull (BBC Electrical Services, Inc.)
Edward Smith (H-J Family of Companies)
James Spaulding (Fort Collins Utilities)
Travis Spoone (EATON Corporation)
Michael Thibault (Pacific Gas & Electric)
Alan Traut (Howard Industries)
Reinaldo Valentin (Duke Energy)
John Vartanian (National Grid)

Joshua Verdell (ERMCO)
Shelby Walters (Howard Industries)
Alan Wilks (Consultant)
Michael Zarnowski (Carte International)

List of Guests:

Thomas Callsen (Weldy-Lamont Associates)
Matthew Chisholm (IFD Technologies)
William Coughlan (Metglas, Inc.)
Qusai Elnimri (VanTran Industries, Inc.)
Michael Gonzales (Southern California Edison)
Luke Grandbois (IFD Technologies)
Garza Hector (Orto de Mexico)
Traci Hopkins (H2Scan)
Gilbert Kozer (Northeast Transformer Services, LLC)
Patrick Kozer (Northeast Transformer Services, LLC)
Jason Lambert (JST Power)
Angela Leigl (EATON Corporation)
Tiffany Lucas, P.E. (Prolec GE)
Kenneth McKinney (UL LLC)
Timothy Menter (Lincoln Electric System)
Kent Miller (T&R Electric Supply Co.)
Martin Munoz (Orto de Mexico)
Ismael Naja (EATON Corporation)
Michael Pappas (Roechling Industrial)
Miguel Plascencia (Pacific Gas & Electric)
Mason Rush (Central Moloney Inc)
Fernando Salinas (Power Partners)
Albert Sanchez (Knoxville Utilities Board)
Jaber Shalabi (VanTran Industries, Inc.)
Ali Syed (ComEd)
Chris Talbert (JST Power)
Bruce Webb (Knoxville Utilities Board)

██████ C57.12.34 – Three Phase Pad-Mount Transformers – Steve Shull

Steve Shull reported that the group was in the process of starting up a new PAR and that they would continue work as a Working Group at the fall meeting. Following minutes were submitted..

The Chair called the meeting to order at 3:15 P.M. EST on March 20, 2023. Attendees identified themselves by name and affiliation verbally.

1. Agenda Review
The Chair displayed the agenda for this meeting. Since this was an inaugural meeting under the new PAR, the group verbally approved the Agenda.
2. Minutes Approval
Minutes of the PAR Study Group Meeting in Charlotte on 10/17/22 were verbally approved.

3. Confirmation of IEEE SA Essential Patent Statement

The patent information request was displayed. The chair provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or if a participant is personally aware of patent claim(s)/patent application claim(s) that may be essential for the use of this standard. There were no responses to this request so no patent claim(s)/patent application claim(s) were identified.

4. IEEE SA Copyright Policy Statement

IEEE-SA's copyright policy is described in Clause 7 of the *IEEE-SA Standards Board Bylaws* and Clause 6.1 of the *IEEE-SA Standards Board Operations Manual*. The Chair stated that any material submitted during standards development, whether verbal, recorded, or in written form, is a Contribution and shall comply with the IEEE-SA Copyright Policy. The Chair displayed this copyright policy.

5. IEEE SA Participant Behavior

All participants in IEEE-SA activities are expected to adhere to the core principles of the IEEE Code of Ethics, IEEE Code of Conduct and the Standards Board Bylaws.

6. New Business

There were a number of items that were already identified to be review. These were:

- Update all references to latest revision of IEEE 386.
- Update secondary voltages, i.e. Many renewables are at 690Y/398 but they are constructed like 480Y/277 ratings, Add a new secondary voltage of 416Y/240. This voltage is currently being used to supply Server Farms.
- Revise A.10.2 Hot spot thermal sensor-Resistor temperature detector (RTD) to add more detail.
- Review the values for the induced voltage test using a three phase source and impulse testing procedure above the 600 volt threshold. We need to insure that the impulse testing values conform to IEEE Std. C57.12.00, particularly as they might pertain to this standard.
- Update bushing drawings to reference C57.19.02 and make them consistent with a common labeling practice, i.e. X3 and not X₃.

The Chair asked for any additional suggestions on changes that may be included for the next update. There was one suggestion concerning adding a decal or stencil on the outside of the transformer something like this "Do Not Landscape Around This Transformer". It was indicated that this is typically user specified, but we should think about adding it to the standard. Touch temperature was briefly discussed and all were encouraged to attend the TF on Touch Temperature later that day. The group was asked to think about changes that need to be added and bring them to the next meeting in Kansas City or email the Chair.

7. The meeting adjourned at 3:45 P.M. EST.

Submitted by: Alan Wilks

Date: 3/21/2023

Attendance:

NAME	Company
Rehan Ali	Siemens Energy

NAME	Company
Iasin Khan	NEETRAC - Georgia Tech

NAME	Company
Fernando Salinas	Power Partners

Cheryl Basel	WEG Transformers USA Inc.	Gary King	Howard Industries	Albert Sanchez	Knoxville Utilities Board
Jared Bates	Oncor Electric Delivery	Zan Kiparizoski	Howard Industries	Anil Sawant	Virginia Transformer Corp.
Brian Baumann	Cargill, Inc.	Brian Klaponski	Carte International Inc.	Jaber Shalabi	VanTran Industries, Inc.
Ales Bertuzai	Georg	Gilbert Kozier	Northeast Transformer Services, LLC	Michael Shannon	Rea Magnet Wire
Kevin Biggie	Weidmann Electrical Technology	Patrick Kozier	Northeast Transformer Services, LLC	Avijit Shingari	Pepco Holdings Inc.
Thomas Callsen	Weldy-Lamont Associates	Andrew Larison	Hitachi Energy	Stephen Shull	BBC Electrical Services, Inc.
Razmungo Chapa	WEG Transformers USA Inc.	Weijun Li	Braintree Electric Light Dept.	Edward Smith	H-J Family of Companies
John Chisholm	IFD Corporation	Parry Lively	Tempel	James Spaulding	Fort Collins Utilities
Matthew Chisholm	IFD Corporation	Alejandro Macias	CenterPoint Energy	Christopher Sullivan	Westmark Partners
Rhett Chrysler	ERMCO	Lee Matthews	Consultant	Chris Talbert	JST Power Equipment
Will Coughlan	Metglas, Inc.	Tim Menter	Lincoln Electric System	Michael Thibault	Pacific Gas & Electric
Thomas Dautat	AEP-SWEPCO	Kent Miller	T&R Electric Supply Co.	Reinaldo Valentin	Duke Energy
Antonio Di Biase	Tempel	Rhea Montpool	Schneider Electric	John Vartanian	National Grid
Benjamin Garcia	Southern California Edison	Michael Morgan	Duke Energy	Joshua Verdell	ERMCO
Miguel Garcia	Hitachi Energy	Daniel Mulkey	Mulkey Engineering Inc.	Pragnesh Vyas	Sunbelt-Solomon Solutions
Carlos Gaytan	Prolec GE	Jerry Murphy	Reedy Creek Energy Services	Shelby Walters	Howard Industries
Ali Ghafourian	H-J Enterprises, Inc.	Stephen Oakes	WEG Transformers USA Inc.	Bruce Webb	Knoxville Utilities Board
Michael Gonzales	Southern California Edison	Tyler Parenti	Cargill, Inc.	Zachery Weiss	WEG Transformers USA Inc.
Luke Grandbois	IFD Technologies	Dwight Parkinson	EATON Corporation	Alan Wilks	Consultant
Kenneth Hampton	Baltimore Gas & Electric	Martin Rave	ComEd	Guang Yuan	Hitachi Energy
Gicvanini Hernandez	Virginia Transformer Corp.	Robert Reepe	Georgia Power Co.	Joshua Yun	Virginia Transformer Corp.
Ramadan Issack	American Electric Power	Mason Rush	Central Moloney, Inc.	Michael Zarnowski	Carte International

C57.12.36 – Distribution Substation Transformers – Jerry Murphy

This working group did not meet.

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

Ali Ghafourian presented the following minutes from the working group meeting on March 20, 2023 at 12:55 p.m. with 57 in attendance. Ali also noted that he would be submitting a request for a two year PAR extension.

1. Presiding Officer and Secretary responsible for Meeting Minutes

Ali Ghafourian (Chair) – Presiding Officer, Martin (Marty) Rave (Vice-Chair) and Jarrod Prince (Secretary) are responsible for Meeting Minutes.

2. Call to order, Verification of Quorum, and Chair's remarks

The meeting was called to order by the Chair, Ali Ghafourian, at 1:45 p.m. CDT on Monday, March 20th, 2023, held at the Hyatt Regency Milwaukee Hotel in room, Executive Ballroom (Floor 2).

Quorum was established with 31 out of 53 Working Group members present by a show of hands counted at beginning of the meeting. Per paper rosters, we had 31 members accounted for as being present during the meeting.

The Chair announced to the Working Group that the ballot on Draft 2.8 opened on Monday, February 6th, 2023, and closed on Wednesday, March 8th, 2023.

The ballot results were presented to the Working Group.

The Chair stated the ballot had 96 individuals join the Ballot Group with 84 votes returned (87%, 75% min. required) with 76 approved votes (93%, 75% min. required) with 96 comments to be resolved.

The Chair informed the Work Group that the Technical comments would be reviewed during this meeting and if time allowed the Work Group would proceed to resolve the Editorial and General comments.

3. Presented required IEEE SA Patent and Copyright Policies Slides, Call for Patents

The essential Patent and Copyright presentation slides were shown as required. During the review of the Patent and Copyright Policy slides, the Chair called for all essential Patents and Copyrights amongst the Working Group. No essential Patent or Copyright claims were brought forth to the Chair.

4. Approval of agenda

The agenda (AGENDA C57.12.38_2023_Milwaukee(R1).pdf) was issued to the Working Group two weeks prior to the meeting for review.

The Chair asked the Working Group members for the unanimous approval of the agenda. Josh Verdell made the first Motion to unanimously approve the agenda.

Stephen Shull (Steve) seconded the Motion.

The agenda was unanimously approved.

5. Approval of minutes of previous meeting

The Fall 2022 meeting minutes (F22-C57.12.38-UnapprovedMinutesR0.pdf) were posted to the Distribution Subcommittee website on Friday, October 28th, 2022, for the Working Group members to review before this meeting.

The Chair asked the Working Group members for the unanimous approval of the Fall 2022 meeting minutes.

Jerry Murphy made the first Motion to unanimously approve the Fall 2022 meeting minutes.

Paul Chisholm seconded the Motion.

The Fall 2022 meeting minutes were unanimously approved.

6. Meeting Discussion Topics

Technical Comments resolved from Ballot on Draft 2.8

- **Comment ID (310440) and # (I-84) on Clause 13 Line 3**

Proposed Change: "Unless otherwise specified, the installation shall be level within 6 degrees of horizontal. If a user's installation requires a greater angle of tilt, the user shall specify the required angle in the purchase specifications."

Disposition Status: Rejected

Disposition Detail: "Specific accessories have different transformer angle of tilt from horizontal requirements/limitations, and it is impractical to list them all in this standard."

Daniel (Dan) Mulkey offered a motion with a second from Stephen (Steve) Shull to not revise the existing language regarding transformer angle of tilt from horizontal. This motion was unanimously approved by the Working Group.

- **Comment ID (310437) and # (I-81) on Clause 10.2 and Line 17**

Proposed Change: Add "(trade size)" after "UNC" (2 places)

Disposition Status: Accepted

Disposition Detail: Not required.

Stephen (Steve) Shull offered a motion with a second from Daniel (Dan) Mulkey to include "(trade size)" after UNC and NPT values specified in the standard since there is no metric equivalent. This motion received 17 votes For and 2 votes Against and 12 Abstentions. The motion passed.

- **Comment ID (310368) and # (I-68) on Clause 4.2 and Line 6**

Proposed Change: Does the placing of the Footnote "c" reference in Table 3 mean that 150kV BIL is included as well as 125kV BIL? Needs clarification...

Disposition Status: Revised

Disposition Detail: Change Table 3 to add 34 500GRDY/19 920 125 BIL record and remove footnote c from 150 BIL and add to 125 BIL record similar to C57.12.20.

Michael (Mike) Thibault offered a motion with a second from Edward (Ed) Smith to add a record for 125 kV BIL for 34 500GrdY/19 920 V in Table 3 which needs to refer to footnote "c". The reference to footnote "c" should be removed from the record for the 150 kV BIL 34 500GrdY/19 920 V in Table 3. This motion was unanimously approved by the Working Group.

- **Comment ID (309585) and # (I-13) about the Scope**

Proposed Change: Revised Scope: These transformers are rated 250 kVA and smaller with primary voltages of 34 500 GrdY/19 920 V and below for operation between one phase and grounded neutral and secondary voltages of 480/240 V and below...

Disposition Status: Rejected

Disposition Detail: The Working Group will take this up for consideration for possible change in a future revision.

Daniel (Dan) Mulkey offered a motion with a second from Stephen (Steve) Shull to reject the comment regarding changing the wording in the standard referencing “high voltage” to “primary voltage” and “low voltage” to “secondary voltage”. This motion was unanimously approved by the Working Group.

The next revision of the Draft (Draft 2.9) will include all changes that have been labeled as Accepted or Revised during the Ballot Comment review.

Ballot Resolution Committee Permission

Daniel (Dan) Mulkey offered a motion with a second from Edward (Ed) Smith to authorize the Ballot Resolution Committee to resolve any Editorial and General Ballot Comments and bring any other ballot comments that are deemed to be Technical back to the Working Group for review at the next meeting. This motion was unanimously approved by the Working Group.

Before Adjournment

The Chair announced that the Ballot Resolution Committee will be given the ballot comments to review and report back to the Working Group at the Fall 2023 meeting.

The Chair will lead the Ballot Resolution Committee along with the Vice-Chair and Secretary. Additional Members of the Ballot Resolution Committee are listed below.

Joshua (Josh) Verdell	ERMCO
Ramadan Issack	American Electric Power
Robert Reepe	Georgia Power Co.
Andrew Larison	Hitachi Energy

The Chair will submit a request for a two-year PAR extension after this Working Group meeting due to the PAR expiring at the end of 2023 and the comments have not been resolved from the initial ballot.

7. Old Business

No old business items were brought forth to the Working Group during the meeting.

8. New Business

No new business items were brought forth to the Working Group during the meeting.

9. Next meeting – Date and Location

The Chair announced the next meeting for Fall 2023 will be held at The Westin Kansas City at Crown Center in Kansas City, Missouri (USA).

Dates: October 22nd – 26th, 2023

10. Adjournment

The Chair adjourned the meeting at approximately 3:00 p.m. CDT.

List of Attendees and Affiliations:

1	Jared Bates	Oncor Electric Delivery	Member
2	Thomas Callsen Weldy	Lamont Associates	Member
3	John Chisholm	IFD Corporation	Member
4	Craig DeRouen	ERMCO	Member
5	Benjamin Garcia	Southern California Edison	Member
6	Carlos Gaytan	Prolec GE	Member
7	Ali Ghafourian (Chair)	H-J Enterprises, Inc.	Member
8	Kenneth Hampton	Baltimore Gas & Electric	Member
9	Ramadan Issack	American Electric Power	Member
10	Andrew Larison	Hitachi Energy	Member
11	Angela Leigl	EATON Corporation	Member
12	Kent Miller	T&R Electric Supply Co.	Member
13	Michael Morgan	Duke Energy	Member
14	Daniel Mulkey	Mulkey Engineering Inc.	Member
15	Jerry Murphy	Reedy Creek Energy Services	Member
16	Dwight Parkinson	EATON Corporation	Member
17	Jarrood Prince (Secretary)	ERMCO	Member
18	Martin Rave (Vice-Chair)	ComEd	Member
19	Robert Reepe	Georgia Power Co.	Member
20	Albert Sanchez	Knoxville Utilities Board	Member
21	Stephen Shull	BBC Electrical Services, Inc.	Member
22	Edward Smith	H-J Family of Companies	Member
23	James Spaulding	Fort Collins Utilities	Member
24	Markus Stank	Maschinenfabrik Reinhausen	Member
25	Christopher Sullivan	Westmark Partners	Member
26	Reinaldo Valentin	Duke Energy	Member
27	Joshua Verdell	ERMCO	Member
28	Pragnesh Vyas	Sunbelt-Solomon	Member
29	Shelby Walters	Howard Industries	Member
30	Bruce Webb	Knoxville Utilities Board	Member
31	Alan Wilks	Consultant	Member
32	Rehan Ali	Siemens Energy	Guest
33	Kush Arora	Reinhausen Manufacturing Inc.	Guest
34	Alejandro Ayala*	Power Partners	Guest
35	Christopher Borck	EATON Corporation	Guest
36	Chris Brown*	San Diego Gas & Electric	Guest
37	Fidel Castro*	San Diego Gas & Electric	Guest
38	Matthew Chisholm*	IFD Technologies	Guest
39	Will Coughlan	Metglass Inc.	Guest
40	Thomas Dauzat*	Prolec GE	Guest
41	Antonio Di Biase	Tempel	Guest
42	Anacez Dias	Eaton Brazil	Guest
43	Fernando Duarte*	Electric Power Research Inst.	Guest
44	Roger Dugan	Electric Power Research Inst.	Guest
45	Qusai Elnimri	Vantran Industries	Guest
46	Miquel Garcia*	Hitachi Energy	Guest

47	James Gardner	Prolec GE Waukesha	Guest
48	Hector Garza	Orto de Mexico	Guest
49	Michael Gonzales	Southern California Edison	Guest
50	Jean Hernandez-Mejia*	NEETRAC - Georgia Tech	Guest
51	Karl Jakob	Cargill, Inc.	Guest
52	Patrycja Jarosz	IEEE	Guest
53	Joe Kelly	TCI Sales	Guest
54	Qasin Khan*	NEETRAC - Georgia Tech	Guest
55	Evan Knapp	EATON Corporation	Guest
56	Gilbert Kozer	NE Transformer Services, LLC	Guest
57	Patrick Kozer	NE Transformer Services, LLC	Guest
58	Jason Lambert	JST Power Equipment	Guest
59	Parry Lively	Tempel	Guest
60	Lee Matthews	Howard Industries	Guest
61	Brian McBride	Cargill, Inc.	Guest
62	Tim Menter	Lincoln Electric System (LES)	Guest
63	Martin Munoz Molina	Orto de Mexico	Guest
64	Hugo Murillo	H-J Family of Companies	Guest
65	Ismael Naja	EATON Corporation	Guest
66	Tyler Parenti*	Cargill, Inc.	Guest
67	Miguel Plascencia*	Pacific Gas & Electric (PG&E)	Guest
68	Mason Rush	Central Moloney Inc.	Guest
69	Fernando Salinas*	Power Partners	Guest
70	Steve Snyder	Hitachi Energy	Guest
71	Ali Syed*	ComEd	Guest
72	Chris Talbert	JST Power Equipment	Guest
73	Craig Tennant	H-J Enterprises, Inc.	Guest
74	Elliot White	SD Myers	Guest
75	Malia Zaman	IEEE	Guest

C57.12.39 – Tank Pressure Coordination – Carlos Gaytan

This working group did not meet

Task Force on Transformer Efficiency and Loss Evaluation – Phil Hopkinson

Phil presented the following minutes from the task force meeting on March 20, 2023 at 9:30 a.m.

The Fall meeting of the task force met on Monday, October 17, 2022 at 9:30 AM. The meeting was chaired by Philip Hopkinson, the task force chairman. Prior to the meeting, the unapproved agenda and a Power Point presentation addressing several DOE related organizations on distribution transformer loading was circulated to the entire Distribution Transformer Subcommittee. By count from the circulated rosters, 141 persons were in attendance. Without comment on the proposed agenda, the technical presentation was started. A copy of the Power Point presentation is contained in Phil Hopkinson's site under the Distribution Transformer Subcommittee site. The chairman made opening comments regarding the previous meeting looking at dual-kVA nameplate rating of transformers, while the focus of this meeting was on future load growth.

When the slide showing peak versus nameplate loading was discussed, several comments regarding the difference between the peak and average from various regions and even individual meters. This ratio might vary between five and ten. It was stated that the Dan Mulkey slide has an X-axis of percent loading and is slight skewed giving a mode value which would differ from the average value.

The discussion on the possible loss reductions of 20% for the hypothetical NOPR from the DOE 2016, showed the probable solution may only be possible with an amorphous core steel. A slide with calculations on a 25 kVA and 50 kVA, with the current 2016 DOE limits, showed the no load and load loss values at 100% and 50% loading comparing M3 steel and amorphous steel. Interestingly, load loss seems to increase by more than 50% for the amorphous design compared to the M3 core steel design. If the DOE would issue a NOPR calling for 20% lower losses, the result would be chaotic and likely mean that only amorphous cores could practically reach the efficiency only copper windings and amorphous core steel would be needed.

A projection from the EIA indicates that only a 1% per year growth rate in energy may exist until the year 2050. A comment on demographics would certainly permit levels in many regions of the country to exceed this rate by a significant factor. Other projections indicate growth could be as high as 50% by the year 2050. This rate of load growth could still be achieved with M3 core steel.

With the push to reduce hydrocarbon fuels, three electric growth markets were presented. One of these is the transportation electrification. With the average car driving 12000 miles per year and the average of 3 miles per KWH might yield each EV adding about 4000 KWH per year. Heavier vehicles average about 2 miles per KWH. Building electrification is headed to reduce natural gas with heating being replaced by heat pumps. Codes and standards are well underway to promote this growth. The result of this will be to thermally stress transformers on the grid which will be more critical in the future. Many challenges in the final conversion to electric vehicles will be the current inability to provide reliable power to many regions and to provide high speed chargers..

1. Technical Topics

<https://nemaorg137.sharepoint.com/:p:/s/ita/EVAqm71P7k5Br2u9O5-4tsBxQHHbiD9RGfIPs-UdoFJQ?e=9qh1YZ>

DOE has proposed increasing the efficiency for distribution transformers significantly, effective in 2027. Submersible and Network Transformers will remain at the DOE 2016 Efficiency Levels. DOE has added 3750kVA and 5000kVA to the scope of three phase ratings. Phil Hopkinson asked stakeholders from different OEMs to provide info based on test results from different product lines.

- Al Traut (Howard Industries) provided test results on Liquid-filled single phase.
 - 25kV overhead transformers weight would go up about 40%; weight increase much less for amorphous.
 - Research shows that efficiency is reduced with higher loading; and at higher loads amorphous is less-efficient than GOES
 - Amorphous designs are only 20% heavier under the NOPR
 - With GOES there's a lot of conversion to copper, which contributes to weight - supply chain issues.
 - 250 kVA and higher – difficult/impossible to design to meet NOPR requirements. DOE has not fully taken weight into consideration.
 - Supply: if we move to 100% amorphous the supply chain will flip. Equipment is completely different for amorphous.

- Aaron Meyers of Eaton provided information on test results for 3-phase MV liquid transformers
 - Observations
 - GOES increases 50% in weight
 - Amorphous increases 5% in weight
 - Sound levels are 5% higher with amorphous than GOES
 - With amorphous – greater flux density in the 3rd harmonic which leads to losses
- Colby Lovins of Federal Pacific presented information for LV dry-type transformers
 - Single-phase weight will increase 250%
 - Aluminum will go to copper from aluminum.
 - Stacked cores replaces by wound
 - GOES replaced by amorphous; if we stayed with GOES have to go to highest grade
- Joe Tedesco of Hitachi Energy presented test results for MV dry-type transformers
 - The pain for this class isn't as acute because DOE decided to only push up to EL 2
 - In most cases, GOES will be sufficient but it will need to be highest grade of GOES
 - For 15kV – aluminum is nearly impossible above 4250 kVA
- Brian Marquardt presented findings on behalf of Cleveland-Cliffs
 - Electrical steel very small footprint in terms of overall product
 - Grain-oriented is 80% of electrical steels production
 - It will be very costly for Cleveland Cliffs to switch to producing amorphous steel
- Dan Mulkey, User issues
 - For the proposed NOPR, DOE has based their regulations on prior loading studies; but they do not take into account loading changes
 - EIA has projected a 35% load increase in electric power by 2050
 - As an example, the load on single-phase transformers will increase due to electric heating requirements in CA

A representative of Hitachi Metglas was in the audience and provided some information on that company

- Now owned by Bain, which owns Proterial (in Japan) but Proterial's CEO is located in US
- Metglas has manufacturing in Conway, SC where they make some cores but mostly ribbon. Actual core making, including shaping and epoxy casting is done in a separate site.
- Metglas will be able to more than triple capacity for US by 45,00 tons and possibly to 70,000 tons of ribbon capacity by 2027, which is far below the total replacement of GOES in amounts > 200,000 metric tons.
- Nothing was stated about core fabrication production that also must reach similar levels to the ribbon.
- Our conclusion is that Amorphous replacement of GOES could not happen as needed by 2027.

2. Adjourn

The meeting adjourned at 10:50am CT

Task Force Members		
Last	First	Company
Ayers	Donald	Ayers Transformer Consulting
Blew	David	Retired
Britton	Jeffrey	Phenix Technologies
Brown	Darren	Howard Industries
Callsen	Thomas	Weldy-Lamont Associates
Di Biase	Antonio	Tempel
Elliott	William	AEP Swepco
John	John	Virginia Transformer
Kennedy	Sheldon	Niagara Transformer
King	Gary	Howard Industries
Levin	Alexsandr	Weidmann Electrical Technology
Lively	Pary	Tempel
Marquardt	Bryan	Cleveland-Cliffs
Montpool	Rhea	Schneider Electric
Mulkey	Daniel	Mulkey Engineering Inc.
Murphy	Jerry	Reedy Creek Energy Services
Parkinson	Dwight	Eaton
Pepe	Harry	Phenix Technologies
Prince	Jarrold	ERMCO
Rashid	Adnan	Measurement Canada
Shannon	Michael	Rea Magnet Wire
Shertukde	Hemchandra	University of Hartford
Shirasaka	Yukiyasu	Hitachi Ltd.
Shull	Stephen	BBC Electrical Services
Smith	Edward	H-H Family of Corporations
Spurlock	Mike	Spurlock Engineering Services
Tendulkar	Vijay	Eaton
Vartanian	John	National Grid
Verdell	Joshua	ERMCO
Wilks	Alan	Consultant

PC57.167 – Guide for Monitoring Distribution Transformers – Gary Hoffman

Mike Thibault, for Gary Hoffman, reported on the status of PC57.167. The working group did not meet.

Report was that comment resolution should now be complete and the document is finishing up editorial review. The expectation is that the document should be published in the coming months.

██████ C57.12.35 – Bar Coding for Transformers and Regulators– Rhett Chrysler

Rhett Chrysler presented the following minutes from the working group meeting on March 21, 2023 at 1:45 p.m. with 33 in attendance. Rhett also noted that he would be applying for a PAR extension to allow time to complete the work.

1. Chair called the meeting to order at 1:45pm. Members introduced themselves with their affiliation.
2. Total attendance of 33 is listed below. 16 of 21 members present and quorum was verified (76%). 3 guests requested membership. Chair Report
 - a. PAR for revision of C57.12.35 approved on 6/13/19 with an expiration date of 12/31/2023. The current published document C57.12.35-2013 also expires 12/31/2023.
 - b. WG Chair submitted draft to MEC and was returned to Chair 3/21/23. Only minor editorial comments received.
3. Chair called for identification of essential patents pertaining to the work of this WG. None brought forward. Copyright policy presented. No issues identified.
4. Motion to approve meeting agenda (Jerry Murphy/Alan Wilkes). Approved unanimously.
5. Motion to approve Fall 2022 Charlotte meeting minutes (Steve Shull/Alan Wilkes). Approved unanimously.
6. Old Business
 - a. New manufacturer/repair facility code requests should be sent to the Dist Trans SC chair. Malia Zaman to research the procedure to update the list.
 - b. Motion (Jerry Murphy/Steve Shull) to revise Clause 4.2.2.1.1 as follows - *The manufacturer shall be identified with a unique two-digit character string which is available as an IEEE SA download.*¹ *Manufacturers not listed may apply to the Distribution Transformers Subcommittee Chair to be added.*² Motion passed with unanimous approval. Note, the actual footnote numbers in the document are 9 and 10 respectively.
 - c. WG Chair to include the updated list with the source material submitted to IEEE SA for publishing.
7. New Business
 - a. Chair to initiate the IEEE SA ballot on 3/21/2023.
 - b. Chair to submit 2 year PAR extension request after document goes to initial ballot.
8. Next meeting – Kansas City, MO October 22-26, 2023
9. Meeting adjourned at 2:30pm CDT.

Submitted by: Alan Traut, Secretary

Date: 03/21/2023

¹ Recommended manufacturer codes currently in use are available at <https://standards.ieee.org/downloads>.

² Distribution Transformers Subcommittee Chair contact information is available at <https://www.transformerscommittee.org/subcommittees/distributiontransfsc/>.

10.

Attendance:

First Name	Last Name	Company or Affiliation	Role	First Name	Last Name	Company or Affiliation	Role
Rehan	Ali	Siemens Energy Inc	Guest	Tim	Menter	Lincoln Electric Systems	Guest
Alejandro	Ayada	Power Partners	Guest	Jerry	Murphy	Reedy Creek Energy Services	Member
Jared	Bates	Oncor Electric Delivery	Member	Dwight	Parkinson	EATON Corporation	Guest
Chris	Brown	SDG&E	Guest	Martin	Rave	ComEd	Guest
Darren	Brown	Howard Industries	Member	Robert	Reepe	Georgia Power Co.	Member
Rhett	Chrysler	ERMCO	Member	Mason	Rush	Central Moloney	Guest
Alex	Cochran	U.S.E.	Guest	Fernando	Salinas	Power Partners	Guest (R)
Craig	DeRouen	ERMCO	Guest	Alberto	Sandoval	Eaton Corp	Guest
Carlos	Gaytan	Prolec GE	Member	Hemchandra	Shertukde	University of Hartford	Guest (R)
Rafael	Grajeda	Eaton Corp	Guest	Stephen	Shull	BBC Electrical Services, Inc.	Member
Kenneth	Hampton	Baltimore Gas & Electric	Member	Ali	Syep	Comed	Guest (R)
Ramadan	Issack	American Electric Power	Member	Chris	Talbert	JST Power Equipment	Guest
Patrycja	Jaros	IEEE SA	Guest	Michael	Thibault	Pacific Gas & Electric	Member
Gary	King	Howard Industries	Member	Alan	Traut	Howard Industries	Member
Andrew	Larison	Hitachi ABB Power Grids	Member	Alan	Wilks	Consultant	Member
Alejandro	Macias	CenterPoint Energy	Member	Malia	Zaman	IEEE SA	Guest
Lee	Matthews	Howard Industries	Member				

Task Force Tank Touch Temperature – Bruce Webb

Bruce presented the following minutes from the task force meeting on Monday March 20, 2023, at 4:45 PM with forty-eight (48) in attendance. Nineteen (19) of them being one of our current Thirty (32) Members.

1. Call to Order
The meeting was called to order by the Chair (Bruce Webb) with Vice-Chair (Ali Ghafourian) and Secretary (Albert Sanchez) in attendance on Monday March 20, 2023, at 4:45 PM.
2. Welcome and Introduction
The Chair identified the meeting topic, welcomed the attendees.
3. Attendance and Contact Sheets
The Secretary (Albert Sanchez) distributed attendance sheets and the Chair requested that new attendees provide clear and legible email addresses to address the ongoing 123Signup platform issues. Twenty-four (24) attendees completed this request with nine (9) requesting membership and the remaining participating as guests.
4. Participant Behavior
The Chair displayed several slides identifying the IEEE Codes of Ethics & Conduct expectations and specifically asked the attendees to maintain responsible behavior during the meeting, to treat one another nicely and with respect, and to avoid injuring others reputation or employment. There was no opposition to the requirements or request.
5. Essential Patent Claims
There was a call for essential patent(s) by the Chair. There were none brought forward. The Chair announced if there was one to let the Chair, Vice Chair, or Secretary know. The IEEE essential patent claim slides and guidelines were shown to the TF attendees, and this was recorded by the Secretary.

6. Copyright Policy
The IEEE copyright slides and guidelines were shown to the TF attendees without further discussion, and this was recorded by the Secretary.
7. Quorum Check
A quorum of nineteen (19) Members was achieved from our roster of thirty (32) Members.
8. Approval of agenda
As this was the second meeting of the Distribution Transformer SC TF on Tank Touch Temperature, the meeting attendees were provided the Chair's proposed agenda for their consideration and approval. The agenda was approved without any opposition.
9. Review of TF Directive
To keep the TF meeting on track, Members and Guests were reminded of our Directive from the SC:

‘... the Task Force is to further investigate perceived safety concerns regarding tank touch temperatures for transformers that are accessible to the public by...
 - a. exploring input and feedback from outside resources and experts,
 - b. evaluating opportunities to specifically address such concerns, and
 - c. making recommendations to the SC for next steps, if any.’
10. Guest Presentation
Jean C. Hernandez-Mejia (Georgia Institute of Technology) “NEETRAC’s Project on Padmounted Tank Temperatures”
11. Old Business
Individual or Company situational conditions for any incidents or actions taken related to tank touch temperatures, and b) February 21st Brainstorming Session Recap
12. Next Steps
The Chair resolved to reach out to attendees via survey for potential ideas on how to address this concern prior to the next in-person meeting without attendee objection. Mr. Hernandez (Georgia Institute of Technology) to clarify naming and corroborate results on charts presented to the Task Force members and guests.
13. Next meeting--date and location

The Next meeting will be the **Fall 2023 Meeting Kansas City, MO, USA**
14. **Adjournment**

The meeting was adjourned by the Chair at 5:55 PM

Submitted by: Albert Sanchez

Date: March 30, 2023
 Attendance

	Last Name	First (Given) Name	Company (Affiliation)
1	Ali	Rehan	Siemens Energy, Inc.
2	Arteaga	Javier	Hitachi Energy
3	Ayala	Alex	Power Partners
4	Bates	Jared	Oncor Electric Delivery
5	Betancourt	Edwin	Siemens-Energy
6	Biggie	Kevin	Weidmann Electrical Technology
7	Brown	Darren	Howard Industries
8	Callsen	Thomas	Weldy Lamont
9	Castellanos	Juan	Prolec GE
10	Chakraborty	Arup	Delta Star Inc.
11	Chapa	Raymundo	WEG
12	Chisholm	Matthew	IFD Technologies
13	Coker	Anthony	M&I Materials
14	Cook	Michael	Dominion SC
15	Cruz Valdes	Juan Carlos	Prolec GE
16	Derouen	Craig	ERMCO
17	Duarte	Fernando	EPRI
18	Ghafourian	Ali	H-J Enterprises
19	Grandbois	Richard(Luke)	IFD Technologies
20	Hampton	Ken	BGE
21	Hernandez-Mejia	Jean	GT-NEETRAC
22	Hogg	Ryan	Bureau of Reclamation
23	Karl	Jakob	Cargill
24	Klaponski	Brian	Carte International Inc.
25	Kozer	Patrick	Northeast Transformer
26	Kozer	Gilbert	Northeast Transformer
27	Lucas	Tiffany	Prolec GE
28	Machain	Jose	Prolec GE
29	McKinney	Ken	VL Solutions
30	Menter	Tim	Lincoln Electric System
31	Murphy	Jerry	RCES
32	Nims	Joe	Allen & Hoshall
33	Parkinson	Dwight	Eaton
34	Plascencia	Miguel	PG&E
35	Reepe	Robert	GA Power Co.
36	Rush	Mason	Central Moloney Inc.
37	Sanchez	Albert	KUB
38	Sbravati	Alan	Hitachi Energy
39	Shull	Stephen	BBC Electrical Services
40	Smith	Ed	The H-J Family of Companies
41	Syep	Ali	ComEd
42	Thibault	Mike	PG&E
43	Tillery	Tim	Howard Industries
44	Tyler	Morgan	Duke Energy
45	Valentin	Reinaldo	Duke Energy
46	Verdell	Joshua	ERMCO
47	Walters	Shelby	Howard Industries

48	Webb	Bruce	KUB
49	Wilks	Alan	Consultant
50	Yang	Fei	Hitachi Energy

C.3 Old Business

- No old business was discussed

C.4 New Business

Dan Mulkey brought up that throughout standards terminology regarding High/Low/Medium voltage was inconsistent. 12.80 has definitions but maybe they need to be reviewed. Recommended a Task Force be formed to make working for Primary/Secondary voltage consistent throughout standards. Dan Sauer commented that 12.80 was about to go to ballot.

San Sauer made a motion to form a PAR study group to review/revise C57.15. Steve Shull provided a 2nd and the motion was passed unanimously.

Motion was made by Steve Shull to apply for a PAR for C57.12.36 and C57.12.39 using the same scope and title. Motion was 2nd by Dan Mulkey and approved unanimously.

C.5 Chairman's Closing Remarks and Announcements

Jerry had no closing comments to the SC.

C.6 Adjournment

Jerry adjourned the meeting as provided in the meeting agenda at 10:44am.

List of Attendees and Affiliations:

Last Name	First Name	Role	Company
Ali	Rehan	Guest	Siemens Energy
Almeida	Nabi	Member	Prolec GE
Arteaga	Javier	Member	Hitachi Energy
Ayala	Alex	Guest	Power Partners
Ayers	Donald	Member	Ayers Transformer Consulting
Bates	Jared	Member	Oncor Electric Delivery
Biggie	Kevin	Member	Weidmann Electrical Technology
Blaszczuk	Piotr	Guest	Specialty Transformer Components LLC
Blew	David	Member	Retired (PSE&G)
Britton	Jeffrey	Guest	Phenix Technologies, Inc.
Brown	Darren	Member	Howard Industries
Callsen	Thomas	Member	Weldy-Lamont Associates
Chisholm	John	Member	IFD Corporation
Chrysler	Rhett	Member	ERMCO
Colopy	Craig	Member	Retired (Eaton)
Dauzat	Thomas	Member	AEP Swepco
DeRouen	Craig	Guest	ERMCO
Di Biase	Antonio	Guest	Tempel
Dulac	Hakim	Member	Advanced Power Technologies
Dutta Roy	Samraghi	Member	Siemens Energy
Ferreira	Marcos	Member	Engineering Consultation Services
Frimpong	George	Guest	Hitachi Energy
Garcia	Benjamin	Guest	Southern California Edison
Gardner	James	Member	Prolec GE - Waukesha
Gaytan	Carlos	Member	Prolec GE
Ghafourian	Ali	Member	H-J Enterprises, Inc.
Ghosh	Rob	Member	General Electric
Gonzales	Michael	Guest	Southern California Edison
Gonzalez	Luis	Guest	Conduct Industries Limited
Grabdbois	Richard	Guest	IFD Technologies
Gross	Detlev	Guest	Power Diagnostix Consult GmbH
Gyore	Attila	Guest	M&I Materials Ltd
Hampton	Kenneth	Member	Baltimore Gas & Electric
Heiden	Kyle	Member	EATON Corporation
Hernandez Cano	Sergio	Member	Hammond Power Solutions
Hoffman	Saramma	Guest	PPL Electric Utilities
Hogg	Ryan	Guest	Bureau of Reclamation
Hopkinson	Philip	Member	HVOLT Inc.
Issack	Ramadan	Member	American Electric Power
John	John	Member	Virginia Transformer Corp.
King	Gary	Member	Howard Industries
Klaponski	Brian	Member	Carte International Inc.
Lachman	Mark	Guest	Doble Engineering Co.

Larison	Andrew	Member	Hitachi Energy
Lee	Moonhee	Member	Hammond Power Solutions
Levin	Aleksandr	Guest	Weidmann Electrical Technology
Li	Weijun	Member	Braintree Electric Light Dept.
Lively	Parry	Guest	Tempel
Macias	Alejandro	Member	CenterPoint Energy
Mai	Tim-Felix	Member	Siemens Energy
Matthews	Lee	Member	Howard Industries
McBride	James	Guest	JMX Services, Inc.
McBride	Brian	Member	Cargill, Inc.
Menter	Timothy	Guest	Lincoln Electric System
Miller	Kent	Member	T&R Electric Supply Co.
Minikel	Justin	Guest	EATON Corporation
Montpool	Rhea	Member	Schneider Electric
Mulkey	Daniel	Member	Mulkey Engineering Inc.
Murphy	Jerry	Chair	Reedy Creek Energy Services
Narawane	Aniruddha	Guest	EATON Corporation
Oakes	Stephen	Member	WEG Transformers USA Inc.
Parkinson	Dwight	Member	EATON Corporation
Patel	Vinay	Guest	Consolidated Edison Co. of NY
Payerle	George	Guest	Carte
Pepe	Harry	Guest	Phenix Technologies, Inc.
Prince	Jarrod	Member	ERMCO
Radu	Ion	Member	Hitachi Energy
Rashid	Adnan	Guest	Measurement Canada / ISED
Rave	Martin	Secretary	ComEd
Reepe	Robert	Member	Georgia Power Co.
Riordan	Kevin	Guest	WEG Transformers USA Inc.
Ronchi	Rodrigo	Guest	WEG-Voltran
Rush	Mason	Guest	Central Moloney, Inc.
Salinas	Fernando	Guest	Power Partners
Sanchez	Albert	Member	Knoxville Utilities Board
Sauer	Daniel	Member	EATON Corporation
Sawant	Anil	Guest	Virginia Transformer Corp.
Schindler	Stefan	Member	Maschinenfabrik Reinhausen
Schwartz	Dan	Guest	Quality Switch, Inc.
Selvaraj	Pugal	Member	Virginia Transformer Corp.
Shalabi	Jaber	Guest	VanTran Industries, Inc.
Shertukde	Hemchandra	Member	University of Hartford
Shingari	Avijit	Member	Pepco Holdings Inc.
Shull	Stephen	Member	BBC Electrical Services, Inc.
Simons	Andre	Guest	JFE Shoji
Snyder	Steven	Member	Hitachi Energy
Spaulding	James	Guest	Fort Collins Utilities
Stank	Markus	Member	Maschinenfabrik Reinhausen

Annex C

Stankes	David	Guest	3M
Stretch	Kerwin	Member	Siemens Energy
Szczechowski	Janusz	Member	Maschinenfabrik Reinhausen
Taylor	Marc	Guest	JFE Shoji Power Canada Inc.
Tendulkar	Vijay	Member	EATON (Power Distribution, Inc. (PDI))
Thibault	Michael	Member	Pacific Gas & Electric
Tillery	Timothy	Member	Howard Industries
Traut	Alan	Member	Howard Industries
Vartanian	John	Member	National Grid
Verdell	Joshua	Vice-Chair	ERMCO
Vyas	Pragnesh	Member	Sunbelt-Solomon
Washburn	Alan	Guest	Burns & McDonnell
Webb	Bruce	Member	Knoxville Utilities Board
Weiss	Zachery	Member	WEG Transformers USA Inc.
Whitehead	William	Guest	H2scan Corporation
Williams	Trenton	Member	Advanced Power Technologies
Yun	Joshua	Member	Virginia Transformer Corp.
Zanwar	Anand	Guest	Siemens Energy
Zarnowski	Michael	Member	Carte International
McKinney	Ken	Guest	UL Solutions
Grooms	Brad	Guest	NTS
Fu	Renji	Guest	ERMCO
Duaxte	Fernando	Guest	EPRI
Tatu	Valerie	Guest	Powersmiths
Plascencia	Miguel	Guest	PG&E
Castro	Fidel	Guest	SDGE
Gupta	Ravi	Guest	Megger
Garcia	Miguel	Guest	Hitachi Energy
White	Elliot	Guest	SD Myers
Dugan	Roger	Guest	EPRI
Chisholm	Matthew	Guest	IFD Technologies
Moreno	Andre	Guest	Siemens Energy
Kelly	Joe	Guest	TCI Sales
Talbert	Chris	Guest	JST Power Equipment
Lambert	Jason	Guest	JST Power Equipment
Nunn	Tommy	Guest	JST Power Equipment
Hall	Michael	Guest	Mid Central Electric
Viereck	Karsten	Guest	Reinhausen Germany
Tarango	Erik	Guest	Olson
Cho	Eunyoung	Guest	Hico - America
Wirte	Kevin	Guest	Cargill, Inc.
Craven	Michael	Guest	Qualus Power Services
Khan	Dasim	Guest	Neetrac - Georgia Tech
Jarosz	Patrycja	Guest	IEEE SA
Naja	Ismael	Guest	Eaton

Annex C

Alahmed	Alex	Guest	Evergy
Da Silva	Roberto	Guest	Cargill
Yuan	Guang	Guest	Hitachi Energy
Brown	Chris	Guest	SDGE
Munoz	Martin	Guest	Orto de Mexico
Kham	Qasim	Guest	Neetrac - Georgia Tech
Sullivan	Christopher	Guest	Westmark Partners
Coughlan	William	Guest	Metglas
Panesar	Parminder	Guest	Virgina/Georgia Transformer
Mihir	Amin	Guest	Eaton Copr
Syed	Ali	Guest	Comed
Ansari	Tauhid	Guest	Hitachi Energy
Elnimri	Qusai	Guest	Vantran Industries
Ali	Rehan	Guest	Siemens Energy

Annex D Dry Type Transformers Subcommittee

Wednesday, March 22, 2023

IEEE Transformer DTSC Spring 2023 Meeting Milwaukee, WI

Chair: Casey Ballard

Vice-Chair: David Walker (absent from meeting)

Secretary: Dave Stankes

D.1 Introductions, Chairs Remarks and Approval of Agenda and Minutes

The Dry-type Transformers Subcommittee (DTSC) met in the Executive Ballroom (2) at the Hyatt Regency Milwaukee, WI on March 22, 2023, at 1:30 PM (CST)

The Chair notified the attendees that the meeting would be recorded for the purpose of accurately documenting the minutes, and that recording would be erased once minutes were completed.

Introductions:

Introductions were made and Chair reminded participants to announce one's name and affiliation prior to speaking.

Roster was circulated and Chair requested any member who did not receive an e-mail invitation to this meeting to include it as they sign the roster as the e-mail the DTSC has on file is not accurate.

Chairs remarks:

Currently there is no active system to enter the required attendance for meetings as AMS has been deactivated. Members will be receiving an e-mail from Member Planet / Committee Management System (CMS) which is the system that is replacing AMS. Chair asked that members sign in and register on the CMS within the next month. Registration on the CMS is mandatory requirement for attending IEEE Transformer Committee Meeting. The CMS is expected to be operational in time for the Fall 2023 meeting. Once CMS is online it is expected that the attendance rosters from meetings that were recorded in Excel spreadsheets, etc. will be uploaded onto the new system as well as old AMS attendance data.

Working Group (WG) and Task Force (TF) minutes from Fall meeting are requested to be turned in to Dave Stankes (Secretary) by March 31st.

Copyright policy and Participant Behavior slides were reviewed with the attendees.

Chair encouraged Chairs to conduct meetings between the main Spring and Fall meetings. If a WG is planning to hold a meeting, notification to the broader Transformers Committee meeting can be made by posting to the IEEE Transformer Committee website. Requests to post invitations on the website can be sent to tc-webmaster@ieee.org. Reminded attendees that attendance and meeting minutes from these in between meetings must be taken and retained, and information from these should be rolled into the minutes you submit for the following Spring or Fall meeting. A question was raised whether or not these rules also pertain to TF meetings, and Chair confirmed that TF's should follow the same rules.

Chair introduced Patrycja Jarosz, the new IEEE Liaison who will be the main contact for the DTSC.

There is one mandatory training for all leaders of WG's and TF's, *Understanding IEEE SA's Antitrust, Competition, and Commercial Terms Policies*. Training will take less than 30 minutes. Leaders must complete the training within 90 days of being appointed or before the end of the year. The *WG Chair Fundamentals* training that had been previously described as mandatory is now optional (but highly recommended.)

Chair recognized and congratulated DTSC member Rhea Montpool who recently attained Transformer Committee Member status. Chair encouraged those interested in becoming a Committee Member to check the TC website for requirements and procedure for submitting request.

Chair also recognized and congratulated Aleksandr (Sasha) Levin for receiving Outstanding Contributor award for his many great contributions to the IEEE Transformer Committee.

Chair reviewed slide showing requirements for WG and TF minutes. Commended the group for doing a good job complying with these requirements.

Chair presented a slide with the names of all current members. There were 46 attendees. Twenty of the 31 members of the DTSC were present, so quorum was reached.

Approval of agenda and meeting minutes:

Chair entertained a motion to approve the planned agenda that was displayed at the meeting. Motion to Approve – Aniruddha Narawane. Vijay Tendulkar then seconded the motion. Agenda was approved unanimously.

Chair entertained a motion to approve the Fall 2022 DTS meeting minutes that were posted on the Transformer Committee website. Motion to Approve – Tim-Felix Mai, 2nd – Joe Tedesco. The minutes from the Spring 2021 DTSC meeting were approved unanimously.

D.2 Working Group/Task Force Reports

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

D.2.1 Revision of IEEE C57.16 Chair Art Del Rio

WG did not meet. PAR has been extended to end of 2024 allowing the WG to continue work on the document.

D.2.2 Revision of IEEE C57.12.52 Chair Joseph Tedesco

Joe noted that the WG did not meet as the document has just completed a ballot recirculation. One comment and one disapproval were received, and it is expected these can be resolved without the need for another ballot.

D.2.3 Revision for IEEE Revision of C57.12.01 Chair Casey Ballard

The meeting was called to order on Monday March 20 at 1:45 pm by Chair Casey Ballard.

The chair made opening comments and introduced the leaders of the WG.

This is the third meeting of the WG for this next round of IEEE C57.12.01 continuous revision.

Attendance was collected and the meeting was convened with 53 participants, 24 members were present out of 30 total WG members; the meeting quorum was established. The membership can be requested and will be granted if the attendance requirements are met.

The list of attendees is presented at the end of this report.

The Meeting Agenda was reviewed.

Motion: “approve the Agenda”, moved by C. Lovins, seconded by A. Narawane, approved unanimously.

The Unapproved Minutes of the Spring 2022 meeting were reviewed (Minutes were posted on the website).

Motion: “approve the Spring 2022 Meeting Minutes”, moved by T-F. Mai, seconded by J. John, approved unanimously.

Chairman requested patent disclosure, no patent claims were made.

IEEE Guidelines on WG procedure and IEEE Copyright policy have been reviewed and understood.

The chair commented that to be the most efficient all suggestions shall be provided in writing and sent to the Chair in advance of the WG meetings.

Old Business

TF Report on Environmental Conditions (Mai)

- Storage: TF presented the proposal and Tim-Felix moved to include the storage requirements in the clause of Usual Service Conditions. K. Klein seconded. After discussion, the motion was approved with 18 approval votes and 0 votes against.

Motion:

4.1.10 Storage

- *Transformers should be stored in such condition to prevent condensation, moisture absorption, and the entrance of water and other foreign material.*

- Operation: TF presented the proposal and Tim-Felix moved to include the de-energized operation requirements in the clause of Usual Service Conditions as subclause 4.1.11. D. Stankes seconded. After discussion, M. Saraf proposed to substitute the word “should” with “shall”, this friendly amendment was accepted. The motion was approved with 15 approval votes, 0 votes against and 8 abstain.

Motion:

4.1.11 Operation

While the transformer is in service, humidity conditions are generally not important. In the event that a dry-type transformer is de-energized and allowed to cool to ambient temperature, particularly if atmospheric conditions are such as to cause condensation within the housing, precautions shall be taken. If such precautions are not taken the unit should be inspected for evidence of moisture and insulation resistance checked. If there is evidence of moisture or if the insulation resistance is low, the transformer should be dried.

- Environmental Classes: Tim-Felix presented one of the options for the consideration of WG. Chair asked WG whether this topic is of interest and got confirmation. The TF will continue the work and present the proposal in the next meeting. C. Lovins has joined the TF.

- Flame and Toxicity: S. Chiang presented information on the FST (Flame Spread (Burn Rate), Smoke and Toxicity Requirements applied for the components of the traction infrastructure, including transformers (on-board, trackside transformers, terminals, etc.) Solomon moved to include FST in IEEE C57.12.01, seconded by Tim-Felix; approved with 9 votes for, 2 against and 11 abstained. S. Chiang will join the existing TF on Environmental Conditions to develop and present the specific proposal on FST.

TF Report on Solid-Cast Pole-Mounted Transformers (Tedesco)

To include this type of transformers, the modification of the following sections was proposed: Normative reference, Definitions, Location, Polarity, Table 10, Subclauses 6.3, 6.5.1, Testing.

J. Tedesco made a motion to include proposed additions and changes in IEEE C57.12.01, T-F. Mai seconded. WG discussion: enclosure / no enclosure, the tests shall be developed if necessary, ice and salt deposition requirements, interchangeability with oil-type. The word “shall” will be substituted with “should” in the proposed wording of clause 6.3. W. Li asked to check the current definition in the (new) C57.12.80 – pole-type vs. pole-mounted. WG approved the motion with 17 approval votes, 1 vote against and 4 abstained.

Motion:

2 Normative references

- Add C57.12.20

3 Definitions

- *Dry-type pole-type transformer: A transformer in which the core and coils are in a dry compound insulating medium, and without an enclosure, suitable for mounting on a pole.*

4.1.7 Location

- *Pole-type transformers shall be suitable for outdoor operations without an enclosure, meeting the requirements specified in 6.3.*

5.7.1.1 Polarity of single-phase pole-type transformers

- *Polarity shall be additive for all single-phase pole-type transformers in sizes 200 kVA and smaller having high-voltage windings 8660 V and below. Polarity shall be subtractive for all other single-phase pole-type transformers.*

Table 10 (in Clause 5.12 Nameplates)

- *Enclosure designation, footnote k (addition is underlined)*
- *The preferred enclosure designations are from NEMA C57.12.55. Pole-type transformers may be labeled as “None.” If specified, other designations may be used.*

6.3 Pole-type transformer

- *These dry-type transformers are installed outdoors without an enclosure and are directly exposed to precipitation, humidity, condensation, pollution, ambient temperatures, and solar ultraviolet radiation. The external materials used in the transformer shall limit degradation and/or damage from this direct exposure. The air and creepage distances for high-voltage and low-voltage bushings shall be designed for such exposure.*
- *For maximum interchangeability, support lugs shall comply with IEEE Std C57.12.20. The maximum dimensions and weights of these transformers shall comply with IEEE Std C57.12.20.*
- *This subclause would be new. The current subclauses 6.3 through 6.7 would be incremented to 6.4 through 6.8.*

6.5.1 Terminals of single-phase pole-type transformers

- *For maximum interchangeability, bushings and terminals shall be in accordance with IEEE Std C57.12.20.*

Insulation Resistance Testing Pass/Fail Criteria (Tedesco) J. Tedesco will participate in the work of TF on insulation resistance in Test SC and monitor the development. No changes are proposed for this revision.

New Business

No New Business was discussed in the meeting.

New topics may include:

- Electric Vehicle Charging Transformers
- On-load Tap Changers
- 25 Times Limit On Short Circuit Current
- Consequences of Exceeding a Maximum System Voltage
- Inclusion of 50 Hz

Other New Business

None.

The WG will meet again during the Fall 23 IEEE TC meeting.

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

Chair: Casey Ballard
Secretary: Sasha Levin

WG IEEE C57.12.01 Meeting Participants List – Spring 2023

	Last name	First name	Company Name	Role
P	Amin	Mihir	EATON Corporation	Guest
p	Ballard	Robert	DuPont	Chair
p	Bratu	Lorin	Trench Group	Guest (RM)
p	Chiang	Solomon	The Gund Company	Member
p	Cole	Casey	Invenergy	Guest
p	Debass	Samson	EPRI	Guest (RM)
p	Frye	Rich	Eaton	Guest
p	Fu	Renjie	ERMCO	Guest
p	Fyrer	Bob	DuPont	Member
p	Gabriel	Delgado Zamora	Invenergy	Guest
p	Gara	Lorne	Telos	Guest
p	Chrysler	Rhett	ERMCO	Guest
p	Grajeda	Rafael	EATON Corporation	Guest (RM)
p	Gross	Detlev	Power Diagnostix	Guest
p	Guang	Yuan	Hitachi Energy	
p	Hernandez	Giovanni	Virginia Transformer Corp.	Member
p	Hernandez Cano	Sergio	Hammond Power Solutions	Member
p	Hogg	Ryan	Bureau of Reclamation	Member
p	Hopkinson	Philip	HVOLT Inc.	Guest
p	John	John	Virginia Transformer Corp.	Guest
p	Klein	Ken	Grand Power Systems	Member
p	Kushal	Mahajan	EATON Corporation	Member
p	Lee	Moonhee	Hammond Power Solutions	Member
p	Levin	Aleksandr	Weidmann Electrical Technology	Secretary
p	Li	Weijun	Braintree Electric Light Dept.	Member
p	Lovins	Colby	Federal Pacific	Member
p	Mai	Tim-Felix	Siemens Energy	Member
p	Mani	Kumar	Duke Energy	Guest (RM)
p	McKinney	Kenneth	UL	Member
p	Montpool	Rhea	Schneider Electric	Member
p	Moreno	Andre	Siemens Energy	Guest
p	Narawane	Aniruddha	EATON Corporation	Member
p	Nunn	Shawn	Hitachi Energy	Member
p	Nunn	Tommy	?	Guest
p	Peterson	Caroline	Xcel Energy	Guest (RM)

Annex D

p	Podgorski	Damian	Sargent and Lundy	Guest
p	Plante	Sylvain	Hydro Quebec	Guest
p	Powell	Chris	Intermountain Electronics	Member
p	Pugal	Servaraj	VA Transformers	Guest (RM)
p	Sandoval	Alberto	EATON Corporation	Guest (RM)
p	Saraf	Manish	Hammond Power Solutions	Member
p	Sawant	Anil	Virginia Transformer	Guest
p	Shertukde	Hemchandra	UHART	Guest (RM)
p	Sohail	Mihammad Abdullah	Trench Limited	Guest (RM)
p	Sonnenberg	Brian	Instrument Transformers, LLC	Member
p	Staley	Brad	Leeward Renewable Energy	Guest
p	Stankes	David	3M	Member
p	Stretch	Kerwin	Siemens Energy	Member
p	Szczechwski	Janusz	Reinhausen	Guest
p	Sze	Matthew	Omicron Electronics	Guest
p	Tatu	Valeriu	Powersmiths	Guest (RM)
p	Tedesco	Joseph	Hitachi Energy	Member
p	Tendulkar	Vijay	Eaton Santa ana, CA	Member

D.2.4 C57.134 Chair Colby Lovins

Colby noted that the WG did not meet as the document is currently in comment resolution. Ballot achieved 94% approval response. 50 comments were received with 4 disapprovals with comments. Colby will plan to send out an invitation for addressing these comments to the Comment Resolution Team in April. Expect to complete recirculation ballot and be ready to submit to REVCOM in time for their October meeting.

D.2.5 Revision for IEEE 259**Chair Dave Stankes**

Chair: David Stankes

Vice-Chair/Secretary: Joseph Tedesco

This was the sixth meeting of the IEEE 259 Working Group. The meeting was held in the Gilpatrick Meeting Room and Dave Stankes called the meeting to order at 3:14 PM.

Quick introductions were made by everyone in attendance.

There were ultimately 39 people present in the meeting, with 12 members and 27 guests. No one requested membership. Some attendees arrived after the meeting had begun, and a quorum check was done twice. The first time a quorum check was made, there were only 7 members present. After giving people a few moments to arrive, there were 9 members. The Working Group had 17 members; therefore, a quorum was reached, and business could proceed.

Dave and asked for a motion to approve the agenda. Aniruddha Narawane moved to accept the agenda, with Vijay Tendalkar Saraf seconding the motion. There was no discussion, and approval of the agenda was unanimous.

Dave then asked for a motion to approve the minutes of the last meeting. Colby Lovins so moved, with a second from Casey Ballard. There was no discussion, and the approval of the minutes was unanimous.

Dave showed the patent and copyright slides. He asked if there were any patent or copyright concerns from those in attendance; no one had any concerns or noted any patent/copyright issues.

Old Business:

- Dave Stankes discussed finishing the standard and the results of the polls shown at the October 2022 meeting. He continued discussing the decisions made by the task force leaders to move the draft forward:
 - The outcome of the standard would allow for either a thermal index (TI) or a relative thermal index (RTI) to be assigned to an insulation system.
 - The standard would use thermal degradation as the primary aging test, instead of other multi-factor elements (vibration, moisture, etc.).
 - The maximum voltage would be 600 V, to avoid conflict with IEEE C57.12.60.
 - There would be a simplified discussion of test specimens.
 - The ability to modify an insulation system would be added.
- Dave states that IEEE 259 was developed to test insulation systems for transformers compliant with NEMA ST 1 and NEMA ST 20. The current revision of NEMA ST 20 calls for insulation system tested to UL 1446.
- Dave discusses the current structure of task forces.
 - Normative references
 - Definitions
 - Insulation test specimens
 - Test procedures and diagnostics
 - Interpretation of data
 - Modification of insulation systems (this task force will have to be created)
- The latest draft would be posted so that all members and guests would have access.
- Dave discusses the plan for holding virtual meetings between now and the meeting in the fall (~1/month), and then to meet in Kansas City.
 - These would be regular meetings, open to all members and guests.

New Business:

- Tim-Felix shared an update on the draft of IEC 61857-41 that was meant to be informative for the working group.
 - He showed a flowchart that the 61857-41 project team had developed that described the steps for insulation system testing.
 - Given that the testing was meant to be for insulation systems, no transformer-specific tests were to be performed.
 - Dave pointed out that one of the problems with IEEE 259 had been setting a correlation time, with C57.12.60 using 40,000 hours and many LV system tests using 20,000 hours.

Annex D

- Tim-Felix pointed out that the 61857-41 plan was meant to be generic, and simply refers to the relevant product standard. Dave stated that IEEE 259 would provide some guidance on this matter.
 - Though IEC 61857-41 was developed for voltages of 1000 V and up, the general principles can be applied to the test procedures in IEEE 259.
 - Casey asked how the IEC process could be used to call for a RTI if there was no way in IEC currently to have an insulation system temperature class. There was a short discussion of various IEC standards.
 - Dave stated that the overall point was how this process was similar to IEEE 259, and it was just a way for manufacturers to do the testing.
- Dave discussed the general timing he foresaw for this standard. With the monthly meetings, he hoped to be able to have a finished draft and could vote to go to the Subcommittee at the meeting in Kansas City this fall.
 - It would be likely that the PAR would need to be revised before then.
 - Furthermore, C57.12.60 would probably reopen in ~2025 (according to Casey Ballard), so perhaps IEEE 259 and C57.12.60 could align.
- There were questions regarding the connections between IEEE 259 and UL 1446.
 - Manish Saraf asked about the differences between this method and that of UL 1446.
 - Colby pointed out that IEEE 259 must somehow connect to UL 1446, because NEMA ST 20 only references UL 1446.
 - Dave stated that that connection would be determined later.

The date of the next meeting for the whole Working Group was not explicitly announced but would be planned to take place before the Fall meeting in Kansas City.

The meeting was adjourned at 4:17 PM.

Role	First Name	Last Name	Affiliation
Member	Robert	Ballard	DuPont
Member	Piotr	Blaszczyk	Specialty Transformer Components, LLC
Guest	Lorin	Bratu	Trench
Guest	Camilo	Casallas	Trench Limited
Member	Solomon	Chiang	The Gund Company
Guest	Fernando	Duarte	EPRI
Guest	Renjie	Fu	ERMCO
Guest	Rob	Ghosh	GE
Guest	Rafael	Grajeda	Eaton
Guest	Saif	Hossain	Trench Limited
Guest	Ken	Klein	Johnson Electric
Guest	Jason	Lambert	JST
Member	Moonhee	Lee	Hammond Power Solutions
Member	Alexandr	Levin	Weidmann Electrical Technology
Member	Colby	Lovins	Federal Pacific
Guest	Kushal	Mahajan	Eaton
Member	Tim-Felix	Mai	Siemens Energy
Guest	Ken	McKinney	UL Solutions
Guest	Amin	Mihir	Eaton
Guest	Andre	Moreno	Siemens Energy
Member	Aniruddha	Narawane	Eaton Corporation
Guest	Shawn	Nunn	Hitachi Energy
Guest	Tommy	Nunn	JST
Guest	Vinay	Patel	Con Edison
Guest	Caroline	Petersen	Xcel Energy
Guest	Miguel	Plascencia	PG&E
Guest	Klaus	Pointer	Trench Austria
Guest	Chris	Powell	Intermountain Electronics
Guest	Alberto	Sandoval	Eaton
Member	Manish	Saraf	Hammond Power Solutions
Guest	Mike	Sharp	Trench Limited
Guest	Sam	Sharpless	Rimkus
Guest	Muhammad	Sohail	Trench Canada
Guest	Brian	Sonnenberg	ITI
Chair	David	Stankes	3M
Guest	Erik	Tarango	Olsun Electrics
Guest	Val	Tatu	Powersmiths
Secretary	Joseph	Tedesco	Hitachi Energy
Member	Vijay	Tendulkar	Power Distribution, Inc. (PDI)

D.2.6 Revision of IEEE C57.94

Chair Ken Klein

The Working Group met in Regency A, Meeting room. The meeting was called to order at 8:00 AM by Chair Ken Klein.

- Chair made opening comments.
- Introductions were made by all participants. WG Roster has been distributed and signed.

Attendance:

- 29 total participants
- 9 Members
- 20 guests

There were 8 out of 15 members present. A quorum was present.

WG Meeting Agenda

1. Welcome & chair's remarks
2. Introduction of attendees, attendance & determination of quorum
3. Approval of agenda
4. Approval of minutes from Fall 2022 meeting
5. Call for essential Patents & IEEE SA Copyright Policy review
6. Joe Tedesco - Addition of 4.2.4
7. Tim-Felix Mai – Items for discussion

8. Review of TF sections
 - a. Normative references: Roger
 - b. Definitions: Tim-Felix (Complete)
 - c. Application: Colby & Chris (Complete)
 - d. Installation: Dave (Complete)
 - e. Testing: Kerwin & Joe
 - f. Operation: Casey
 - g. Maintenance: Ken Klein & Kerwin

9. Meeting Adjournment

The agenda was approved unanimously without discussion.

Motion: Kerwin, Second: Joe

The WG Meeting minutes of the Fall 2022 Meeting were approved unanimously without discussion.

Motion: Colby, Second: Joe

The chair presented the information on Patent Disclosures and IEEE SA Copyright Policy. He asked the group to report any relevant patent issues – None were communicated.

Old Business:

Joe Tedesco - Addition of 4.2.

4.2.4 Frequent energization

Proposal from IEC/IEEE 60076-16 clause 7.9 to be added to clause 4.2.4

Motion: Accept the text as shown – Joe, Second: Casey

Discussion:

Nothing similar in C57.12.01 maybe good to have this there, too

Motion passed, unanimously.

Tim-Felix Mai – Items for discussion

- Storage
Discussion about using the C57.12.01 proposal and add the reference in section 8.2
Reference should be included, and the wording must be corrected to match the guide.
- Operation
Discussion about using the C57.12.01 proposal and add the reference in section 7.2
Reference should be included.

Review of TF sections

1. Kerwin presented the results of the review of TF Testing
No changes to section 6.1 recommended.

Discussion on rewording section 6.2.1

Motion: Joe, Second: Casey

Change wording "...the following ~~pre-service~~ tests be made before **final connection and energizing of** placing a new or repaired transformer ~~in service~~..."

Motion passed, unanimously.

Discussion on rewording section 6.2.2

The following additional test may be performed ~~if desired, including~~ for the purposes of trending.

Discussion on rewording section 6.3.2

The following optional test ~~are optional~~ may be performed.

Discussion on adding:

- b) Applied voltage test (**at reduced value – see C57.12.91**)

WG agreed to **not** adding the reference.

The other TF will present their results at the next meeting in Kansas City

New Business:
None

The meeting was adjourned, without objection, at 9:15 AM.

The WG will meet again at the Fall 2023 meeting Kansas City (Westin at Crown Center), Missouri USA, March 19 – 23, 2023.

Chair: Ken Klein
Vice-Chair: David Stankes
Secretary: Tim-Felix Mai

Participation list:

First Name	Last Name	Company	
David	Stankes	3M	Vice Chair
Robert	Ballard	DuPont	Member
Tim-Felix	Mai	Siemens Energy	Secretary
Ken	Klein	Johnson	Chair
Joseph	Tedesco	Hitachi Energy	Member
Colby	Lovins	Federal Pacific	Member
Solomon	Chiang	TGC	Member
Kerwin	Stretch	Siemens Energy	Member
Manish	Saraf	Hamond Power	Member
Vijay	Tendulkar	Eaton	Guest
David	Walker	MGM Transformer	Guest
Shawn	Nunn	Hitachi Energy	Guest
Val	Tatu	Powersmiths	Guest
Brain	Sonnenberg	ITI	Guest
Anil	Sawant	Virgina Transformer	Guest
Erik	Tarango	Olsun Electric	Guest
Jusuf	Krvavac	Sargent & Landy	Guest
Bob	Fyrer	DuPont	Guest
Mihir	Amin	Eaton	Guest
Aniruddha	Amin	Eaton	Guest
Rob	Ghosh	GE	Guest
Andre	Moreno	Siemens Energy	Guest
John	Hipchen	Copper Dev	Guest
Rafael	Garjeda	Eaton	Guest
Alberto	Sandoral	Eaton	Guest
Guang	Yuan	Hitachi Energy	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Tony	Di Biase	Temple	Guest
Samson	Debass	EPRI	Guest
Alex	Alahmed	Evergy	Guest

D.2.7 Revision of IEEE C57.96**Chair Aniruddha Narawane**

Chair: Aniruddha Narawane
Vice Chair: Iman Mohammed (Not Present)
Secretary: Kerwin Stretch

- Meeting called to order on time at 11:00 am by the Chair
- The chair presented the information on Patent Disclosures and asked the group to report any relevant patent issues – None were communicated.
- The chair presented the information on the IEEE Copyright – No question, comments, or concerns were raised.
- The current membership list was shown and a poll to establish a quorum was taken. A quorum was achieved with 12 of 15 members present.
- The chair shared the WG Meeting Agenda. The agenda was approved unanimously without discussion.
- The chair shared the Meeting Minutes from the Fall 2022. The minutes were approved unanimously without discussion.
- Manish Saraf (Hammond Power Systems) showed the Excel tool that he created for making load calculations based on EQ 3.
 - Several example calculations were shown
 - Weight is an optional field
 - Exponent can be changed by user if needed
 - Calculation is for ONE winding only (HV / LV must be computed separately)
- ACTION: Secretary will distribute the Excel tool to the working group for review and testing. Feedback can be shared directly with Manish or through the Secretary.
- Draft D3 was shared on screen with the membership.
- Continued discussions about the use of new vs. old cooling classes in Table 4. The proposal to use the new classes per 12.01 and prepare an annex to correlate with the old methodology. Joe Tedesco will prepare a proposal for discussion and approval in the Fall 2023 meeting.
- Sections 6.1 & 6.2 were discussed with minor changes to the text made in the draft shown on screen.
- Chair introduce a question from the NEMA regarding the inclusion of EV Charging topics in the loading guide. After a brief discussion it was the consensus of the group that this was NOT required as the intent of the Loading Guide is to be independent of the load

type. There are interesting impacts coming from the increase in e-mobility but these topics would be better served in another standard or guide.

- Meeting adjourned on time at 12:15
- Next meeting: Fall 2023 – Kansas City, MO.

WG C57.96 - MEETING ATTENDANCE

WG Meeting – Spring 2023 Tuesday, March 21, 2023

Last Name	First Name	Company	Role
Amin	Mihir	EATON Corporation	Guest
Ballard	Robert	DuPont	Member
Casallas	Camilo	Trench Ltd.	Guest
Chiang	Solomon	The Gund Company	Guest
DiBiase	Tony	Tempel Canada	Guest
Duarte	Fernando	EPRI	Guest
Fryer	Bob	DuPont	Guest
Fu	Renjie	ERMCO	Guest
Grajeda	Rafael	EATON Corporation	Guest
Hernandez	Giovanni	Virginia Transformer Corp.	Member
Hernandez	Sergio	Hammond Power Solutions	Guest
Hernandez	Ronald	Doble	Guest
Klein	Ken	Johnson Coil	Member
Kravak	Jusuf	Sargent & Lundy	Guest
Lee	Moonhee	Hammond Power Solutions	Member
Levin	Aleksandr	Weidmann Electrical Technology	Guest
Lovins	Colby	Federal Pacific	Member
Mahajan	Kushal	EATON Corporation	Member
Mai	Tim-Felix	Siemens Energy	Member
Mazzei	Kevin	Black & Veatch	Guest
McKinney	Ken	UL Solutions	Guest
Montpool	Rhea	Schneider Electric	Member
Moreno	Andre	Siemens Energy	Guest
Narawane	Aniruddha	EATON Corporation	Chair
Nunn	Shawn	Hitachi Energy	Member
Powell	Chris	Intermountain Electronics	Member
Sandoval	Alberto	EATON Corporation	Guest
Saraf	Manish	Hammond Power Solutions	Member
Selvaraj	Pugal	Virginia Transformer Corp.	Guest
Stankes	David	3M	Guest
Stretch	Kerwin	Siemens Energy	Secretary
Syed	Ali	COMED	Guest
Tatu	Val	Powersmiths	Guest
Tedesco	Joseph	Hitachi Energy	Member
Tendulkar	Vijay	EATON Corporation	Member
Torango	Erik	Olsun Electrics Corporation	Guest
Yuan	Guang	Hitachi Energy	Guest
		Members	15
		Guests	22

D.2.8 Revision of IEEE C57.124 Chair Tom Prevost

Meeting room: Gilpatrick (1)

3/21/23: 3:15-4:30 pm

Meeting was called to order by Chair Tom Prevost(TP) at 3:15 pm

Secretary H. M. Shertukde (HMS) was held up in a separate meeting elsewhere and could not attend at the start of the meeting. Chair designated Casey Ballard (CB) to assume the Secretary's position till HMS joined the meeting.

The chair made opening comments and introduced himself.

Attendance was collected and the meeting was convened with 40 participants, 10 members were present out of 20 total WG members; the meeting quorum was established.

The list of attendees is presented at the end of this report.

The Meeting Agenda was reviewed.

Motion: "approve the Agenda", moved by Dominique Bolliger, seconded by Tim-Felix Mai, approved unanimously.

The Unapproved Minutes of the Fall 2022 meeting were reviewed (Minutes were posted on the website).

Motion: "approve the Fall 2022 Meeting Minutes", moved by Detlev Gross, seconded by Tim-Felix Mai, approved unanimously.

Chair requested patent disclosure, no patent claims were made.

IEEE Guidelines on WG procedure and IEEE Copyright policy have been reviewed and understood.

The Chair covered the Scope and Purpose.

The Draft 2 document was based on IEEE C57.113 and the WG made modifications as necessary since some of the PD measurement techniques and pass/fail criteria are different between liquid filled and dry-type transformers.

These revisions were made live in the Draft 2 document and included:

- Replacement of Figure 1 with a method that uses a coupling capacitor
- Modifying the frequency ranges lower and upper limits
- Updating the calibration pC level

HMS joined meeting at 3:35 pm and assumed the duties of Secretary back from CB. Two printed rosters were recirculated for members to sign in for this meeting as attached.

After this discussion was completed and edit completed two motions were made by CB

Motion 1:

The draft D2 (with all modifications completed by TP to be presented to the Dry-Type subcommittee for permission to proceed to SA ballot. Motion moved by CB and seconded by Sergio Hernandez (SH)

Motion passed unanimously

Motion 2:

To form a Comment Resolution Group (CRG) that is empowered on behalf of the full WG to make the necessary revisions after comments are received from the balloting process.

Motion made by CB, seconded by SH

Motion passed unanimously.

CRG was formed with TP; Joe Tedesco (JT), Tm Felix(TF), Samson G Debass (SGD); Detlev Gross (DG); SH; Sergio Hernandez, Janus Szczechowski

Following presentation of minutes, **Tom Prevost made a motion to: Submit C57.124 to SA ballot**

The motion was **seconded** by **Sergio Hernandez Cano**.

Chair asked if there was any discussion needed.

Chair asked if any members objected to unanimous approval of the motion.

No abstentions were noted

As there was no objection to unanimous approval, the **motion passed**.

Meeting was adjourned at 4:30 pm

Submitted by:

CB; And; H M Shertukde, Secretary, C.57.124

Included herewith attendance report with only Name, Affiliation, and Membership Status below

Last Name	First Name	Affiliation
Ballard	Robert	DuPont
Caverly	David	Trench Limited
Chiang	Solomon	The Gund Company
Cirino	Fabiana	OMICRON
DEBASS	SAMSON	EPRI
Fyrer	Bob	DuPont
Hernandez Cano	Sergio	Hammond Power Solutions
Iman	Mohammad	MGM Transformer Company
Klein	Ken	Johnson Coil
Lachavce	Mathieu	OMICRON
Lee	Moonhee	Hammond Power Solutions
Lovins	Colby	Federal Pacific
Mai	Tim-Felix	Siemens Energy
Martinez	Joaquin	Siemens Energy
Nunn	Shawn	Hitachi Energy
Peterson	Caroline	Xcel Energy
Pointner	Klaus	Trench Austria GmbH
Prevost	Thomas	Weidmann Electrical Technology
Saraf	Manish	Hammond Power Solutions
Shertukde	Hemchandra	University of Hartford
Sonnenberg	Brian	Instrument Transformers, LLC
Stankes	Dave	3M
Stretch	Kerwin	Siemens Energy
Sze	Matthew	Omicron
Tarango	Erik	Olsun Electric
Tedesco	Joseph	Hitachi Energy
Tendulkar	Vijay	Power Distribution, Inc. (PDI)
Szczechowski	Janusz	Reinhausen
Pepe	Henry	Phenix Technology
Britton	Jeffrey	Phenix Technology
Bolliger	Dominique	HV Technologies Inc.
Morales-Cruz	Emilio	Qualitrol
Munez	Heturo	Mistras
Sze	Matthew	Omicron Electronics
Roman	Zoltan	GE
Abdullah	Ahmad	Mortenson
GROSS	DETLEV	PD CONSULTANT
ZAMAN	MALIA	IEEE SA
JAROSZ	PATRICIA	IEEE SA
MORENO	ANDRE	SIEMENS ENERGY
SAIF	HUSAIN	HV TECHNOLOGIES, INC

SHARP	MIKE	TRENCH LTD.
AMIN	MIHIR	EATON
YUAN	GUANG	HITACH ENERGY
SOELLEV	MARKUS	POWER DIAGNOSTIX SYSTEMS, GMBH

D.2.9 Revision of IEEE C57.12.91 Tim-Felix Mai

- The Working Group met at the Hyatt Regency – Regency A Conference Room. The meeting was called to order at 4:45 PM by Vice Chair, Time-Felix Mai.
- Vice Chair made opening comments.
- 12 of 16 members in attendance. Quorum was met.
- Introductions

Approval of Agenda: The Spring 2023 agenda was approved unanimously without discussion.

Motion: Casey Ballard

Second: Ken Klein

Approval of Minutes: The Fall 2022 minutes were approved unanimously without discussion.

Motion: Vijay Tendulkar

Second: Sergio Hernandez Cano

Call For Patents: The Vice-Chair presented the information on Patent Disclosures and asked the group to report any relevant patent issues – None were communicated.

Copyright Notice: The Vice-Chair presented the IEEE_SA Copyright Policy. No discussion.

Old Business

- Review Revisions Proposal

- **Clause 10.6.1.1** – Joe Tedesco motions for the changes below.
- Kerwin Stretch - Second
- Open commentary: Define QA impulse as Reduced Wave followed by a Full wave. Value for including reduced wave impulse to establish a baseline instead of just two full waves. Two full waves are easy to overlay, thus fast, but establishing the baseline is important.

Proposed Changes to **Clause 10.6.1.1**

- When required to be performed, the impulse test shall precede the low frequency applied voltage and induced voltage tests, with the order of impulse test waves depending on whether the impulse test is a full impulse test or a QA impulse test.
 - Full impulse tests shall consist of, in order, one reduced full wave, two chopped waves, and one full wave.
 - QA impulse tests shall consist of one reduced full wave and one full wave.
- Applicable test voltage values are listed in IEEE Std. C57.12.01.

Open Discussion:

- Number of waves needed
- IEC requirements
- Is one reduced and one full enough to stress the insulation

Vote: 12 for, 0 against, 0 abstain – unanimous approval

- **Clause 10.6.1.1:**

Proposal: Change the sequence of the impulse test (R-C-C-F -> R-F-C-C-F-F)

Current State of Clause 10.6.1.1:

When required to be performed, the impulse test shall precede the low-frequency applied voltage and induced voltage tests. Impulse tests consist of applying, in the following order, one reduced full wave, two chopped waves, and one full wave. Applicable test voltage values are listed in IEEE Std C57.12.01.

- **Proposal: No change**
- **Unanimous agreement**

○ **Clause 5.3.2 –**

Proposed by Joe Tedesco – Definition of “free from drafts”
2nd – Casey Ballard

Current state: Clause 5.3.2

- a) All internal temperatures measured by the internal temperature sensors shall not differ from ambient temperature by more than 2 °C.
- b) Enclosure surface temperatures for sealed units shall not differ from ambient temperature by more than 2 °C.
- c) Ambient temperature shall not have changed by more than 3C for at least 3h.
- d) The transformer has been in a draft-free area for 24 h, and neither voltage nor current has been applied to it for 24 h to 72 h, depending on transformer size.

Proposal: (a –c would remain the same)

Clause 5.3.2

- d) The transformer has been in an area for approximately 24 hours that is as free as is practical from forced air currents.
- e) Neither voltage nor current has been applied for a sufficient time to ensure that conditions (a), (b), and (c) are satisfied. In an environment that satisfies condition (d), this length of time is influenced by the physical size of the transformer.

After extensive discussion, Joe amended the proposal to the following:

Clause 5.3.2

- a) All temperatures measured by the temperature sensors shall not differ from ambient temperature by more than 2 °C.

Minimum Temperatures shall be measured at:

- Top and Bottom of the core
- Top of the innermost winding
- Bottom of the outermost winding
- b) Enclosure surface temperatures for sealed units shall not differ from ambient temperature by more than 2 °C. (No Change)
- c) Ambient temperature shall not have changed by more than 3 °C for 3 hours immediately preceding the measurements for a) or b)

- d) Delete.

The cold temperature shall be the average of the internal temperature sensors or, in the case of a sealed unit where the internal sensors are not available, the average of the surface temperature sensors.

Vote passed unanimously.

○ **Open Discussion: led by Joe Tedesco: Clauses 10.1.2, 10.5.1, and 10.5.4**

Current state:

- Clause 10.1.2 Requires PD to be the last test performed
- Clause 10.5.1: Intention of PD to be confirming the insulation is free of internal discharges
- Preferred arrangement is fully assembled, but testing of single coils allowed
- Clause 10.5.4: HV bus may be removed to ensure PD of the coils ONLY is measured

Discussion:

- How to satisfy Clause 10.1.2 while removing accessories, HV bus, etc. because there was severe PD when the unit was fully assembled?
- If the purpose of PD measurement is to confirm that the coils are PD-free, and this is done through testing per 10.5.1 and 10.5.4, how do you do that AND satisfy the requirement for PD to be the last test?

○ **Motion: Joe Tedesco – change 10.1.2 to the following**

Proposal:

10.1.2: If required, the partial discharge test shall be the last dielectric test performed. Otherwise, the induced voltage test shall be the last dielectric test performed. If disassembly according to 10.5.1 and 10.5.4 is required for successful PD measurement, unit applied voltage and induced voltage tests shall be repeated after reassembly of the unit.

2nd: Manish Saraf

Vote: Unanimously approved

- **Due to time constraints the remainder of the Old Business will be moved to the agenda for the Fall 2023 C57.12.91 meeting**
- **Manish Saraf provided slides for a proposal that was moved to the Fall meeting – to be circulated before Fall 2023 meeting for consideration by the members.**

Adjourned at 6:02

The Working Group will meet again at the Fall 2023 meeting,

Vice Chair: Tim-Felix Mai
Secretary: Rhea Montpool

Participation list:

Last Name	First Name	Company	Req. Membership
Amin	Mihir	Eaton	
Ballard	Robert	DuPont	
Chiang	Solomon	Gund Company	
Fryer	Bob	Dupont	
Fu	Renjie	Ermco	
Grajeda	Rafael	Eaton	
Hernandez	Giovanni	Virginia Transformer	

Hernandez Cano	Sergio	Hammond Power Solutions	
Klein	Ken	Grand Power Systems	
Lambert	Jason	JST	
Lee	Moonhee	Hammond Power Solutions	Y
Lovins	Colby	Federal Pacific Transformer	
Mahajan	Kushal	Eaton	
Mai	Tim-Felix	Siemens Energy	
McKenney	Ken	UL Solutions	
Montpool	Rhea	Schneider Electric	
Morend	Andre	Siemens Energy	
Narawane	Aniruddha	Eaton	Y
Nunn	Tommy	JST	
Nunn	Shawn	Hitachi Energy	
Pepe	Harry	Phenix Tech	
Powell	Chris	I.E.	Y
Sandoval	Alberto	Eaton	
Saraf	Manish	Hammond Power Solutions	
Sonnenberg	Brian	ITI	
Stankes	David	3M	
Stretch	Kerwin	Siemens Energy	
Tarango	Erik	Olsun	
Tatu	Valeriu	Powersmits	
Tedesco	Joseph	Hitachi ABB Power Grids	
Tendulkar	Vijay	Eaton	
Weyer	Daniel	Monolith	

D.2.10 Revision of C57.12.59 Chair Derek Foster (not present) (Casey Ballard offered comments on Derek's behalf)

Draft 1 has been sent out to the WG committee members. If you are interested in working on C57.12.59 please reach out to Derek or Casey Ballard. This WG for revision of C57.12.59 is only meeting virtually.

D .2.11 Standards Report

Chair reported that all the documents that are coming up have a PAR and are being worked on. C57.12.58 Transient Analysis will be the next document in need of volunteers, but this will not be started until next year.

The rotation of standards that started with the elimination of document reaffirmations has resulted in a heavy workload that occurs every five years, although this is beginning to spread out as documents are completed ahead of schedule.

D.3 Old Business

D.3.1 Standards Report

Chair presented slides showing DTSC standards activity and status that are part of the Standards Report found on the Transformer Committee website. Overall message is that the DTSC is good shape. Every document that is scheduled to expire within the next five years are currently being worked on.

Expect that next year we will begin to address standards that begin to approach the need of revision. Chair asked that anyone who is interested in taking on a leadership position for the revision of any of these upcoming documents to let him know.

D.4 New Business

D.4.1 Proposal for an Entity PAR Guide for Bridge-Arm Reactors for Low-Frequency (20 Hz) Power Transmission

- Chair had e-mailed a 30-page slide deck presentation to the members of the DTSC that he had received explaining the PAR proposal.
- Malia was asked by the Chair to explain to the DTSC the details of the Entity PAR including what it is, how it was received, etc. Malia reported:
 - The Entity PAR was received by the IEEE Chapter Council, which was passed on to the IEEE in the US, who in turn forwarded it to the IEEE PES Technical Council Entity Project Management Committee. This committee determines with IEEE Committee the Entity PAR best fits. They decided that this Entity PAR best fit in the Transformer Committee and our committee chair thought it best fit in the DTSC.
 - There are two types of IEEE memberships. Individual and Entity SA membership. The Entity membership is based on a corporate membership which uses a one company one vote model.
 - ONLY Entity SA members may vote on and Entity proposal.
 - A person can check to see if their company is an Entity member by going to the IEEE website. If your company is a member you can join as a designated representative and attend the Entity meetings.
 - IEEE just had one Entity PAR approved (C57.12.200).
- Casey explained that the DTRSC has been asked to become the sponsor of this Entity PAR and whether or not we should become the sponsor would be the topic of the discussion at this meeting. If we decided to be the sponsor of the Entity PAR, we would be looking for a committee representative that would have expertise on the subject. It would also require us to be included in future revision activities, effectively becoming part of the Transformer Committee ongoing duties. If we decided NOT to sponsor the Entity PAR our subcommittee would not be allowed to offer any input to the document going forward. (Entity members could still vote on the document. There is also still the ability to offer comments as part of the Public Review.)
- Malia pointed out that proposals are open to changes. The DTSC should also review and determine if the proposal will overlap on any current standard, and that the proposal is within the scope of our work.
- The Entity Par was reviewed by the Chair and determined to pertain to air core reactors. Chair then asked Art Del Rio as Chair of C57.12.16 and others to offer their opinion. Art and Klaus Pointner reported the following:
 - Current standard we have deals with 60 Hz which is very common and widely used. The standard does not address the design that must be used in a specific application
 - There is a lot of similarities to our current document, with the major difference being frequency.
 - The requirements for lower frequency can be easily calculated for lower frequencies and be incorporated into our current document, perhaps in an Annex.
 - The low frequency design described in the proposal is for a prototype application and not widely used. Standards are typically written for widely used industrial applications.
 - There is a lot of information in C57.12.16, C57.12.21, and IEEE 1277 already contain this type of information.
- Malia suggested to the Chair that the type of details described by Klaus and Art should be presented back to the Transformer Committee Chair, supporting the recommendation that the proposal is at this time not ready for standardization.

Annex D

- Chair also explained that C57.12.16 has just gone to ballot, so the opportunity to address this immediately is not an option at this time.
- Art stated that if it was taken up in future revision of C57.12.16 the title, scope, and purpose would also have to be changed. Perhaps this information could be included in an Informative Annex.
- Malia suggested that the proposers of the Entity PAR be given the option of joining the C57.12.16 ballot pool so they could see the existing similar that addresses a similar topic.
- Malia suggested that it may be best for the DTSC to accept the proposal that was passed onto us, allowing us to offer suggestions on how the proposal and the information it contains may fit.
- Our Transformer Committee Chair should be given the DTSC technical assessment of the proposal, and he will respond.
- Malia stated that the EPM Committee keeps track of these and records and whether or not it accepted or rejected. If proposal is rejected it will be reviewed by the Corporate Advisory Group and they will check our response.
- **Klaus Pointner made a motion** to have the DTSC accept this Entity PAR and assign him to lead the work in preparing a formal response back to the company that had submitted this Entity PAR.

Mike Sharp seconded the motion.

The Chair asked of the members present, are there any objections to the unanimous approval of the motion. Hearing none **the motion was passed.**

With no further business, the meeting was adjourned at 2:35 PM.

Chairman: Casey Ballard

Vice Chairman: David Walker

Secretary: David Stankes (prepared meeting minutes)

Attendees

<u>Role</u>	<u>First Name</u>	<u>Last Name</u>	<u>Company</u>
Guest	Mimir	Amin	Eaton
Chair	Robert	Ballard	DuPont
Guest	Comilo	Casallas	Trench Limited
Guest	Rhett	Chrysler	ERMCO
Member	J. Arturo	Del Rio	Siemens Energy
Guest	Renjie	Fu	ERMCO
Guest	Bob	Fyrer	DuPont
Guest	Miguel	Garcia	Hitachi Energy
Guest	Rob	Ghosh	GE
Guest	Rafael	Grajeda	Eaton
Guest	Detlev	Gross	Power Diagnostix
Member	Sergio	Hernandez Cano	Hammond Power Solutions
Guest	Saif	Hossain	Trench Limited
Member	John	John	Virginia Transformer Corp.
Member	Ken	Klein	Grand Power Systems
Guest	Jason	Lambert	JST Power
Member	Moonhee	Lee	Hammond Power Solutions

Annex D

Member	Aleksandr	Levin	Weidmann Electrical Technology
Member	Colby	Lovins	Federal Pacific Transformer
Guest	Alejandro	Macias	CenterPoint Energy
Member	Tim-Felix	Mai	Siemens Energy
Guest	Kenneth	McKinney	UL LLC
Member	Rhea	Montpool	Schneider Electric
Guest	Andre	Moreno	Siemens Energy
Guest	Jerry	Murphy	Reedy Creek Energy Services
Member	Aniruddha	Narawane	Power Distribution, Inc. (PDI)
Member	Shawn	Nunn	Hitachi ABB Power Grids
Guest	Tommy	Nunn	JST Power
Guest	Caroline	Peterson	Xcel Energy
Member	Klaus	Pointner	Trench Austria GmbH
Guest	Chris	Powell	Intermountain Electronics
Member	Thomas	Prevost	Weidmann Electrical Technology
Guest	Ulf	Radbrandt	Hitachi ABB Power Grids
Guest	Adnan	Rashid	Measurement Canada
Guest	Alberto	Sandoval Moreno	EATON Corporation
Member	Manish	Saraf	Hammond Power Solutions
Member	Michael	Sharp	Trench Limited
Member	Brian	Sonnenberg	Instrument Transformers, LLC
Secretary	David	Stankes	3M
Member	Kerwin	Stretch	Siemens Energy
Guest	Matthew	Sze	Omicron Electronics
Guest	Chris	Talbert	JST Power
Guest	Erik	Tarango	Olsun Electrics Corporation
Guest	Valeriu	Tatu	Powersmiths International
Member	Joseph	Tedesco	Hitachi ABB Power Grids
Member	Vijay	Tendulkar	Power Distribution, Inc. (PDI)
Guest	Guang	Yuan	Hitachi Energy

Annex E Transformers and Reactors for HVDC Applications Subcommittee

March 20, 2023, 4.45 pm local time – Lakeshore B at the Hyatt Regency, Milwaukee, WI

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

Vice Chair: Les Recksiedler (lrecksiedler@yahoo.ca) - absent

Secretary: Klaus Pointner (klaus.pointner@ieee.org)

E.1 Introduction / Attendance / Approval of the Agenda / Essential Patent Issues

There was a total of 18 persons in the meeting, 7 members and 11 guests present. No new request for membership was received.

Call for patents (essential patent claim) and IEEE copyright policy have been addressed.

Actual membership prior the Spring 2023 meeting is shown below:

Last name	First name	Company name
Caverly	David	Trench Limited
<i>Chiang</i>	<i>Solomon</i>	<i>The Gund Company</i>
<i>Davis</i>	<i>Eric</i>	<i>Burns & McDonnell</i>
Ermakov	Evgenii	Hitachi Energy
Falkenburger	Thomas	Coil Innovation USA, Inc.
Gaun	Alexander	Coil Innovation GMBH
Heinzig	Peter	Weidmann Electrical Technology
Hernandez	Giovanni	Virginia Transformer Corp.
<i>Kaineder</i>	<i>Kurt</i>	<i>Siemens Energy</i>
Ploetner	Christoph	Siemens Energy
<i>Pointner</i>	<i>Klaus</i>	<i>Trench Austria GmbH</i>
<i>Radbrandt</i>	<i>Ulf</i>	<i>Hitachi Energy</i>
Recksiedler	Leslie	Manitoba Hydro
Riffon	Pierre	Pierre Riffon Consultant Inc.
<i>Sharp</i>	<i>Michael</i>	<i>Trench Limited</i>
<i>Ziomek</i>	<i>Waldemar</i>	<i>PTI Transformers</i>

7 members out of 16 members were present, thus quorum was not met.

The agenda for this meeting, that was distributed via E-mail on March 10, 2023, was presented, no comments received. Approval of the agenda and minutes of meeting of the Charlotte meeting will be done via E-Mail

The list of all attendees of the meeting is shown below:

First Name	Last Name	Company
Camilo	Casallas	Trench Limited
Solomon	Chiang	The Gund Company
Eric	Davis	Burns & McDonnell
J. Arturo	Del Rio	Siemens Energy
Kurt	Kaineder	Siemens Energy
Omar	Mendez	Prolec GE
Sylvain	Plante	Hydro-Quebec
Klaus	Pointner	Trench Austria GmbH
Bertrand	Poulin	Hitachi Energy
Ulf	Radbrandt	Hitachi Energy
Michael	Sharp	Trench Limited
Waldemar	Ziomek	PTI Transformers
Hossain	Saif	Trench Limited
Duvier	Bedoya	Hitachi Energy
Frank	Neder	Trench Germany
Nina	Sandsten	Hitachi Energy
Vivian	Chan	Hitachi Energy
Eunyoung	Cho	Hilo American

E.2 Approval of the minutes of the October 2022 Fall meeting in Charlotte

The minutes of the fall meeting as distributed by E-mail on March 10, 2023 have been presented. No comments were given. Approval of the minutes will be obtained by separate E-Mail to the members of the SC HVDC.

E.3 Brief report on the meeting of the Administrative SC by Ulf Radbrandt

No specific information from the administrative SC beside that already given at the opening session. For detailed information, please see the general meeting MoM.

E.4 Working Group Reports

The IEEE1277 has been published 2020 (10 years stability until Dec 31, 2030). The dual logo standard IEC/IEEE 60076-57-129 was published 2017 and is good until Dec 31, 2027.
No active working groups.

E.5 Status of the Entity WG for development of the Guide for vibration testing of oil-immersed HVDC converter transformer.

The SC HVDC will sponsor this Entity WG. Therefore, future work of this WG will be reported to this subcommittee. The actual status of the WG is outlined in the presentation submitted to the WG chair prior to the spring meeting. It is planned that representatives of this WG are present at the Fall 2023 meeting in Kansas City.

IEEE Advancing Technology for Humanity Guide for Vibration Testing of Oil-immersed High - Voltage Direct Current (HVDC) Converter Transformer (± 160 kV to ± 1100 kV) PC57.132 China Southern Power Grid IEEE Power and Energy Society Transformers	IEEE Advancing Technology for Humanity Content 1. Working Group 2.Planning of the guide 3. Relevant research progress 4.Next plan 3
IEEE Advancing Technology for Humanity 1. Working Group In the early planning stage of this guide, over 60 people expected to be actively involved in the development of this project, and people come from the 8 entities includes: (1) China Southern Power Grid; (2) State Grid Corporation of China; (3) Electric Power Research Institute; (4) Hitachi energy; (5) Siemens energy; (6) Chongqing University; (7) Wuhan University; (8) Tsinghua University. 3	IEEE Advancing Technology for Humanity Content 1. Working Group 2.Planning of the guide 3. Relevant research progress 4.Next plan 4
IEEE Advancing Technology for Humanity 2.Planning of the guide The expected date of submission of draft to the IEEE SA for Initial Standards Committee Ballot is Dec 2025, and the projected completion date for submittal to RevCom is Oct 2026. Besides, according to the standards development process, the planning of each year is scheduled as: Year 2023 Year 2024 Year 2025 Year 2026 2023 Task 1: Mobilizing a Working Group (holding a meeting) Task 2: Start to Draft the Guide (holding a meeting) 2024 Task: Draft the Guide (holding discussion meeting twice) 2025 Task 1: Finish the Draft (holding discussion meeting twice) Task 2: Submit Draft for MEC 2026 Task 1: Form balloting group and start balloting Task 2: Modify the draft according to comment from balloting (holding discussion meeting twice) Task 3: Submit the draft to RevCom Mobilizing a Working Group Draft the Guide Ballot the Guide Submit to RevCom 5	IEEE Advancing Technology for Humanity Content 1. Working Group 2.Planning of the guide 3. Relevant research progress 4.Next plan 6

3. Relevant research progress



◆ Research on vibration principle of converter transformer –Vibration Sources

Source 1-Core vibration

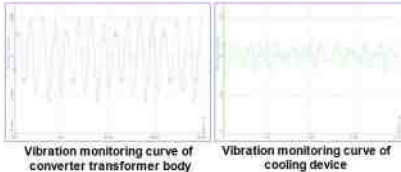
Mutual attraction between silicon steel sheets under the action of magnetostriction and eddy current

Source 2-Winding vibration

Dynamic electromagnetic force caused by load current electrodynamic force and leakage magnetic field

Source 3-Cooling device vibration

Vibration caused by rotation of fan and oil pump motor



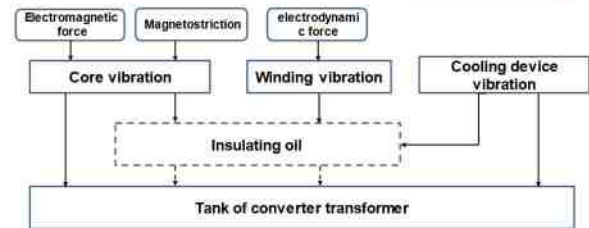
Three kinds of vibration constitute the vibration of converter transformer, but the **main sources** are **core vibration** and **winding vibration**

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3. Relevant research progress



◆ Research on vibration principle of converter transformer –Vibration transmission path



Note: Dashed line indicates liquid conduction; Solid line indicates solid conduction

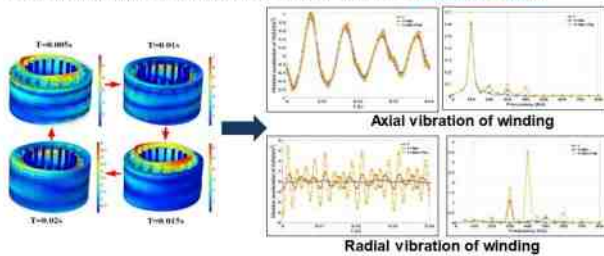
- The vibration of iron core, winding and cooling device can be transmitted to the oil tank through transmission channels such as transformer oil and solid connectors
- The signals of different transmission paths will overlap each other, so the surface vibration of converter transformer box comes from the common vibration of multiple different vibration sources and is coupled through multiple transmission paths

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3. Relevant research progress



◆ Research on vibration principle of converter transformer –Simulation research



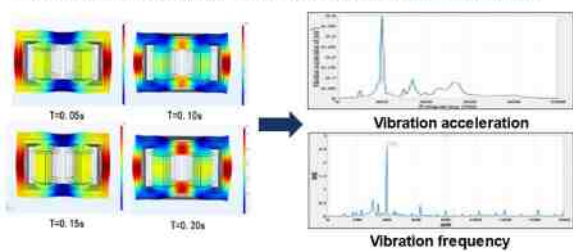
- Through simulation and analysis of winding vibration characteristics under harmonics, it is found that the main frequency of axial vibration of winding under fundamental, 5th and 7th harmonics is still 100Hz, and the spectrum has 200-400Hz components. However, the dominant frequency of radial vibration is shifted to 400Hz. And the radial vibration contribution of the winding exceeds the axial vibration.

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3. Relevant research progress



◆ Research on vibration principle of converter transformer –Simulation research



- Through simulation and analysis of core vibration characteristics under harmonics, it is found that the main frequency of core vibration will also shift from 100Hz to 400Hz, and the spectrum range will become wider, and the high-frequency component will increase.

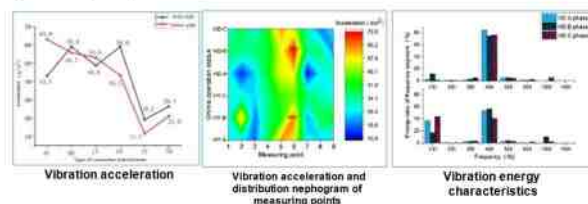
10

3. Relevant research progress



◆ Actual measurement and analysis

We have carried out vibration test for the actual converter transformer and made a preliminary analysis of the data.



- The frequency spectrum of converter vibration is mainly concentrated in 0-2000Hz, with obvious main frequency (mainly distributed in 300Hz-500Hz) and maximum amplitude >3.6g (traditional transformer vibration main frequency 100Hz, maximum amplitude 0.5g). The frequency complexity is large, and the vibration spectrum energy is more dispersed.

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Content



1. Working Group

2. Planning of the guide

3. Relevant research progress

4. Next plan

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4. Next plan The working group plans to participate in the fall meeting of the IEEE Transformer Committee in 2023, and meanwhile, we also welcome experts who interested in this guide to communicate with us, here is the contact information of WG Chair: Dr. Jun Deng, email: 13822116195@139.com	Thank you!

A discussion took place how this SC can influence the work of this WG. Mike Sharp asked about the purpose and scope of this WG and which lever we have to influence this. It is not clear to the SC if the PAR is already approved or not.

Mike Sharp and Klaus Pointner mentioned that the Switchgear Committee can be a role model for the work with entity PAR's.

All agreed that it is important to learn more about this entity PAR's and how to influence their work to avoid losing control of standardization work, pushing it away from the regular process towards entity work, with subsequent limited rights to vote (only entities are allowed to vote for such a standard).

E.6 Dual logo standard IEC/IEEE 60076-57-129

The dual logo standard for HVDC transformers, IEC/IEEE 60076-57-129 is valid until 2027 for IEEE. For IEC there is a stability date of 2024, but that can easily be extended to match IEEE.

Discussion between Chris Plötner (chairman of IEC TC14) and Ulf Radbrandt prior to this meeting resulted in a preliminary agreement to apply for a PAR (IEEE) and RR (IEC) for revision of the standard in the Fall 2023 so joint WG work can start in 2024. Request for approval of this PAR will be done via E-mail.

E.6.1 Experience of the usage of the dual logo standard for HVDC transformers, IEC/IEEE 60076-57-129

Continued discussion from the Fall 2022 meeting (for details - see minutes of the previous meeting)

- IEC editorial review (last time) removed the last paragraph below.

2.1 Use of normative references

This standard can be used with either the IEC or IEEE normative references but, other than for IEC/IEEE dual-logo document references, the references shall not be mixed. The purchaser should include in the enquiry and order which normative references are to be used. If the choice of normative references is not specified, then IEC standards shall be used except for HVDC converter transformers intended for installation in North America where IEEE standards shall be used.

If only one alternative is given in a certain part of the document, i.e. only IEC reference(s) or only IEEE reference(s), then that/these reference(s) is/are valid independent of the choice of normative references.

It could not be corrected. There are single references that should be valid independent on selection of IEC or IEEE – see the following examples.

9.6.5 Acceptance criteria

The test is considered accepted if there is no disruptive discharge and if the measured partial discharges are within the limits given below.

Partial discharges shall be measured with a method according to IEC 60270.

9.16 Insulation power-factor test

Insulation power factor ($\tan \delta$) procedures for tests are described in IEEE Std C57.12.90. The voltage should not be above 10 kV.

Perhaps we should try to get the removed paragraph back?

- The high rate of change of currents is only applicable to LCC.

13.2 Current wave shape

The rate of change of currents in the tap-changer is higher in service on transformers with delta-connected valve windings compared to the corresponding sinusoidal current at fundamental frequency. The purchaser shall specify di/dt for the actual current wave shape.

NOTE Additional information can be found in IEC 60214-2.

Perhaps that should be mentioned.

- Consecutive operation of tap-changers

13.3 Consecutive operation of tap-changers

Unless otherwise specified, the tap-changers shall be capable of continuous uninterrupted tapping from the principal tap to the maximum positive tap and back to the principal tap without exceeding the temperature limits of the transition resistor and other parts of the tap-changer.

This requirement can often be dimensioning for the tap changer and it is often not related to real operation needs.

For LCC it is often relevant to be able to utilize more or less the whole range to lower the secondary side voltage after restart after a DC line ground fault. That is to start again in reduced DC voltage operation. Perhaps should the requirement be changed to “maximum negative to maximum positive” or just let it be chosen by the purchaser.

E.6.2 Call for a chairman of the upcoming WG

The SC chair made a call for the chairman for the upcoming joint WG to work on this standard and to prepare the PAR together with a review of the scope and the purpose.

The SC chair proposed Waldemar Ziomek – SC HVDC long term member to become the chairman of this WG. All present SC members were in favor and Waldemar confirmed interest to act as the chairman.

As there was no quorum at the meeting. The proposal will be sent by E-Mail to the SC members to get a motion to confirm Waldemar as the future WG chair.

E.1 Future Work

The SC is planning to have a presentation on conditional monitoring for converter and smoothing reactors at the Fall 2023 meeting in Kansas City to be prepared by Alexander Gaun and Klaus Pointner.

There could be sections of conditioning monitoring introduced in our standards later.

E.2 Old Business

There was no old business

E.3 New Business

There is no new business

E.4 Adjournment

The meeting was adjourned at 5:30pm.

Annex F Instrument Transformers Subcommittee

Chair: Thomas Sizemore

Vice Chair: David Wallace

Secretary: Nigel MacDonald (unable to attend)

F.1 Introductions

Attendees were requested to introduce themselves and provide affiliations at the time of the meeting.

The table below shows the recorded attendees, affiliations at the time of the meeting and roles in the ITSC. A total of 61 people were in attendance.

First Name	Last Name	Affiliation	Role
Carlos	Alonso	Arteche	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Sanket	Bolar	Oncor	Guest
Susan	Bonfiglio	WAPA	Guest
Lorin	Bratu	Trench Limited	Guest
Jeffery	Britton	Phenix Tech. Division of Doble Engineering	Guest
Chris	Brown	SDGE	Guest
Deniss	Carr	GE Grid Solutions	Member
Fidel	Castro	SDGE	Guest
Jaroslav	Chorzepa	ABB Inc.	Member
Fabiana	Cirino	OMICRON electronics Corp USA	Guest
Michael	Craven	Phoenix Engineering Services	Guest
Daniel	Crockett	Ameren	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Guest
Huan	Dinh	Hitachi Energy	Member
Eric	Euvrard	RHM International	Member
Rob	Ghosh	GE	Member
Andrew	Gregory	ITEC	Guest
John	Herron	Raytech	Guest
Ryan	Hogg	Bureau of Reclamation	Member
Darren	Hoppins	Sensori Ink	Guest
Patryga	Jarosz	IEEE SA	Guest
Kurt	Kaineder	Siemens Energy	Guest
Will	Knapek	OMICRON electronics Corp USA	Member
Ivan	Konta	KONCAR - Instrument Transformers	Member
Mark	Lachman	Doble	Guest
Colby	Lovins	Federal Pacific	Guest
Luis	Machain	Prolec GE	Guest
Kornowski	Marek	Polycast	Member

Lee	Matthews	Consultant	Guest
James	McBride	JMX Services, Inc.	Guest
Scott	McCloskey	Amran	Member
Robert	Middleton	RHM International	Member
Randy	Mullikin	ABB Inc.	Member
Frank	Neder	Trebch Germany	Member
Stephen	Oakes	WEG Transformers USA Inc.	Member
Rudolf	Ogajanov	Hitachi Energy	Member
Jonas	Oliveira	Hitachi Energy	Guest
Dipakkumar	Patel	ITEC	Member
Caroline	Peterson	Xcel Energy	Member
Sylvain	Plante	Hydro Quebec	Guest
Adnan	Rashid	Measurement Canada / ISED	Member
Diego	Robalino	Megger	Member
Patrick	Rock	American Transmission Company	Member
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	RITZ Usa	Member
Steven	Shull	BBC Electrical Services, Inc.	Guest
Thomas	Sizemore	ABB Inc.	Chair
Steven	Snyder	Hitachi Energy	Member
Muhammad Abdullah	Sohail	Trench Limited	Guest
William	Solano	Reinhausen	Member
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Chris	Steineman	Delta Star Inc	Guest
Jacob	Thielbar	WAPA	Guest
Risto	Trifunoski	Trench Limited	Member
David	Wallace	Mississippi State University	Vice-Chair
David	Ward	ITEC	Guest
Barrett	Wimberly	GE Grid Solutions	Member
Malia	Zaman	IEEE	Guest
Peter	Zhao	Hydro One	Guest
Igor	Ziger	KONCAR - Instrument Transformers	Member

F.2 Quorum

Quorum was met. 31 members were present while 22 were required. 30 guests were also in attendance. The total number of attendees was 61 and 4 requested memberships in the ITSC. These requests for membership will be reviewed.

F.3 Agenda

An agenda was displayed by the chair. Rudy Ogajanov made a motion to approve which was seconded by Will Knapek. There were no objections to approving the agenda.

F.4 Approval of minutes – Fall 2022 meeting

Minutes were approved after a motion by Igor Ziger and a second by Pat Rock. There were no objections to approval.

F.5 Essential Patent Claims & IEEE Copyright Policy

A slide was displayed as a reminder to all WG/TF leaders that it is necessary to display the essential patent claim and IEEE copyright policy slides.

F.6 Status of C57.13 Standards

The chair briefly presented the status of the various standards handled by the ITSC including both those being actively worked on at this time as well as those not yet due for revision.

F.7 Working Group Reports

F.7.1 JWG on Station Service Voltage Transformers, IEC-IEEE 63253-5713-8 – David Wallace & Ross McTaggart (unable to attend)

This working group did not meet at the Transformers Committee meeting. However, it has been very active in comment resolution. The status of the comment resolution and latest balloting results were presented. It was indicated that a survey would be sent out to the WG members regarding a potential change. One of the voting countries wanted a change in the load power factor statement under clause 4.

F.7.2.3 Working Group Instrument Transformer Requirements C57.13 – David Wallace

Attendees: There was 61 total participants. 21 members (out of 32, quorum was met), 14 people requested membership (7 met criteria) and 1 member was moved to guest status.

First Name	Last Name	Affiliation	Role
Kayland	Adams	Protec GE Wohkesha	Guest
Carlos	Alonso	Arteche	Guest
Vivek	Bhatt	Prolec GE	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Sanket	Bolar	Oncor	Guest
Susan	Bonfiglio	WAPA	Guest
Lorin	Bratu	Trench Limited	Guest

Deniss	Carr	GE Grid Solutions	Member
Fabiana	Cirino	OMICRON electronics Corp USA	Guest
Daniel	Crockett	Ameren	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Member
Huan	Dinh	Hitachi Energy	Member
Eric	Euvrard	RHM International	Member
Rob	Ghosh	GE	Guest
Michael	Gonzales	Southern California Edison	Guest
Andrew	Gregory	ITEC	Guest
Ravi	Gupta	Megger	Guest
John	Herron	Raytech	Guest
Ryan	Hogg	Bureau of Reclamation	Member
Derek	Hollrah	Burns & McDonnell	Guest
Darren	Hoppins	Sensori Ink	Guest
Kurt	Kaineder	Siemens Energy	Guest
Will	Knapek	OMICRON electronics Corp USA	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Luis	Machain	Prolec GE	Guest
Kornowski	Marek	Polycast	Guest
Lee	Matthews	Consultant	Guest
Scott	McCloskey	Amran	Guest
Robert	Middleton	RHM International	Member
Francis	Mills	Power Engineers	Guest
Randy	Mullikin	ABB Inc.	Guest
Frank	Neder	Trebbach Germany	Guest
Stephen	Oakes	WEG Transformers USA Inc.	Member
Rudolf	Ogajanov	Hitachi Energy	Guest
Jonas	Oliveira	Hitachi Energy	Member
Dipakkumar	Patel	ITEC	Guest
Caroline	Peterson	Xcel Energy	Guest
Sylvain	Plante	Hydro Quebec	Guest
Issack	Ramadan	AEP	Guest
Adnan	Rashid	Measurement Canada / ISED	Member
Patrick	Rock	American Transmission Company	Guest
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	RITZ Usa	Guest
Thomas	Sizemore	ABB Inc.	Vice - Chair
Kenneth	Skinger		Guest
Steven	Snyder	Hitachi Energy	Member

Muhammad Abdullah	Sohail	Trench Limited	Member
William	Solano	Reinhausen	Guest
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Chris	Steineman	Delta Star Inc	Guest
Charles	Sweetster	OMICRON electronics Corp USA	Member
Samuel	Tekle	WEG Transformers USA Inc.	Guest
Jacob	Thielbar	WAPA	Guest
Scott	Thomas	Hitachi Energy	Guest
Risto	Trifunski	Trench Limited	Member
Cody	Vanwyck	Commonwealth Associates	Guest
Mike	Waldrop	MLGW	Guest
David	Wallace	Mississippi State University	Chair
David	Ward	ITEC	Guest
Barrett	Wimberly	GE Grid Solutions	Member
Igor	Ziger	KONCAR - Instrument Transformers	Secretary

Essential Patent Claims: Text was displayed, and the Chair inquired as to if anyone knew of essential patent claims. None were brought up.

Copyright: Text was displayed at the meeting

Agenda: The agenda was presented to the WG. Agenda Approval: 1st Barret Wimberly, 2nd Rudy Ogajanov. No objections.

Minutes: The minutes from the Fall 2022 meeting were presented. Minutes approval: 1st Steve Oakes, 2nd Huan Dinh. No objections

Resolution of comments on Draft 0 starting at #21:

17 comments were reviewed

The main comments / discussion points from the comment resolution are given below:
HW Assignments:

- Comment 21 (Thomas and Randy) - Already working on it.
- Comment 23 (Igor) - Compare altitude clause with IEC 60137
- Comment 28 (Randy) -Extend the curves and write up additional language
- Comment 29 (Not really specified) - Compare the Power frequency requirements with the bushing standard before removing the column
- Comment 30 (Zoltan) - Add Text on 1550 kV voltage level and the findings on it
- Comment 33 (Randy) - Align Um with different standards

- Comment 34 (David and Igor) - See options for a new layout (compare and coordinate with CCVT standard)

- Comment 36 (Igor) - Update the table with the creepage distance according to the SSVT Standard.

David will send out a survey to the workgroup to schedule web meetings in the upcoming months to get through all the comments.

Thomas Sizemore presented that work has been started on creating a section for VT/CT combination units and asked for additional people to review, comment and modify the document that has been started. 12 additional people have volunteered to work on this effort.

Motion to adjourn: A motion was put forth by 1st Barret Wimberly and 2nd by Rudy Ogajanov.

Next Meeting: This WG will meet to continue work at the Kansas City, KS USA, Fall 2023 meeting.

F.7.5 TF for Instrument Transformers Accuracy – Igor Ziger

Attendees: The number of participants was 48. 23 members present and quorum was obtained. Paper rosters / sign-in sheets were circulated. 4 people requested membership which will be reviewed.

First Name	Last Name	Affiliation	Role
Carlos	Alonso	Arteche	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Susan	Bonfoglio	WAPA	Guest
Lorin	Bratu	Trench Limited	Guest
Jaroslav	Chorzepa	ABB Inc.	Member
Fabiana	Cirino	OMICRON electronics Corp USA	Guest
Michael	Craven	Qualus Corp.	Guest
Daniel	Crockett	Ameren	Guest
Gabriel	Delgado	Invenergy	Guest
Huan	Dinh	Hitachi Energy	Member
Rob	Ghosh	General Electric	Guest
Andrew	Gregory	ITEC	Guest
Ryan	Hogg	Bureau of Reclamation	Member
Darren	Hoppins	Sensori Ink	Guest
Lidija	Ivanic	Siemens Energy	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Marek	Kornowski	Polycast International	Member
Colby	Lovins	Federal Pacific	Guest

Luis	Machain	Prolec GE	Guest
Lee	Matthews	Howard Industries	Guest
Scott	McCloskey	Amran Inc.	Member
Robert	Middleton	RHM International	Member
Randolph	Mullikin	ABB Inc.	Member
Frank	Neder	Trench Germany GmbH	Member
Stephen	Oakes	WEG Transformers USA Inc.	Guest
Rudolf	Ogajanov	ABB Inc.	Member
Jonas	Oliveira	Hitachi Energy	Vice-Chair
Dipakkumar	Patel	Instrument Transformer Equip Corp	Member
Igor	Peršinec	Siemens Energy	Guest
Caroline	Peterson	Xcel Energy	Member
Goran	Plišić	Siemens Energy	Guest
Adnan	Rashid	Measurement Canada / ISED	Member
Diego	Robalino	Megger	Guest
Patrick	Rock	American Transmission Co.	Guest
Zoltan	Roman	GE Grid Solutions	Member
Andre	Rottenbacher	Ritz Instrument Transformers	Guest
Thomas	Sizemore	ABB Inc.	Member
Steven	Snyder	Hitachi Energy	Guest
Muhammad Abdullah	Sohail	Trench Limited	Guest
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Chris	Steineman	Delta Star Inc	Guest
Charles	Sweetser	OMICRON electronics Corp USA	Guest
Risto	Trifunski	Trench Limited	Member
Deniss	Villagran	GE Grid Solutions	Member
David	Wallace	Mississippi State University	Member
David	Ward	ITEC	Guest
Barrett	Wimberly	GE Grid Solutions	Member
Igor	Ziger	KONCAR - Instrument Transformers	Chair

Essential Patent Claims: Text was displayed, and the Chair inquired as to if anyone knew of essential patent claims. None were brought up.

Copyright: Text was displayed at the meeting

Minutes of pervious meeting: Unanimously approved with motion brought forward by Thomas Sizemore and seconded by Scott McCloskey.

Agenda: Unanimously approved with motion brought forward by David Wallace and seconded by Rudolf Ogajanov.

Review of the action items for this task force:

Information on TF Officers

- J. Oliveira was officially announced as the co-chair of the taskforce.

Resolution of comments gathered on the Extended Range Clause

- 3 out of 5 comments were addressed and resolved.
- The majority of the meeting was dedicated on a lengthy discussion over the recommended values for extended range and whether the extended range should be limited on the lower end.
- There were multiple contributions from various members and different aspects were discussed in detail.

The main action items that were the result of the lengthy discussion are as follows:

- It was agreed to add explanatory text for bushing type CTs
- It was agreed to keep recommended ratios and add recommended extended range
- A motion was passed to vote whether to use separate accuracy class designation for extended range or to use the existing accuracy class designations. The exact motion was brought forward to by S. McCloskey and seconded by R.Hogg. The motion was for having dedicated ER accuracy classes as proposed in the document. The motion was passed with 19 votes for, 2 against and 1 abstained.

The other approach will be removed from the revised document.

2 comments were left unresolved. An interim meeting should be held to resolve the remaining comments and integrate all agreed points into the text.

All material showcased will be posted on the committee website.

Motion to adjourn: A motion was put forth by D. Wallace and seconded by T. Sizemore

Next Meeting: This WG will meet to continue work at the Kansas City, MO Fall 2023 meeting.

F.7.6 WG for PLC capacitors and Coupling Capacitor Voltage Transformers (C57.13.9) – Zoltan Roman

The Working Group Chair, Zoltan Roman, started the meeting with Mike Craven as Secretary and introductions were made.

Attendees: The number of participants was 31. 15 members present and quorum was

obtained. Additionally, 16 guests were present. Paper rosters / sign-in sheets were circulated.

First Name	Last Name	Company	Role
Zoltan	Roman	GE Grid Solutions	Chair
Carlos	Alonso	Arteche	Guest
Lorin	Bratu	Trench	Guest
Fabiana	Cirino	OMICRON	Guest
Daniel	Crockett	Ameren	Guest
Huan	Dinh	Hitachi Energy	Guest
Andrew	Gregory	ITEC	Guest
Kurt	Kaineder	Siemens Energy	Guest
Will	Kknapek	OMICRON	Guest
Scott	McCloskey	Amran Inc.	Guest
Frank	Neder	Trench Germany GmbH	Guest
Rudolf	Ogajanov	ABB Inc.	Guest
Jonas	Oliveira	Hitachi Energy	Guest
Dipakkumar	Patel	Instrument Transformer Equip Corp	Guest
Muhammad Abdullah	Sohail	Trench Limited	Guest
Christopher	Steineman	Delta Star Inc.	Guest
David	Ward	ITEC	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Robert	Middleton	RHM International	Member
Caroline	Peterson	Xcel Energy	Member
Adnan	Rashid	Measurement Canada / ISED	Member
Patrick	Rock	American Transmission Co.	Member
Andre	Rottenbacher	Ritz Instrument Transformers	Member
Thomas	Sizemore	ABB Inc.	Member
Steven	Snyder	Hitachi Energy	Member
Risto	Trifunoski	Trench Limited	Member
Deniss	Villagran	GE Grid Solutions	Member
David	Wallace	Mississippi State University	Member
Barrett	Wimberly	GE Grid Solutions	Member

Igor	Ziger	KONCAR - Instrument Transformers	Member
Michael	Craven	Qualus Power Services	Secretary

Essential Patent Claims: Text was displayed, and the Chair inquired as to if anyone knew of essential patent claims. None were brought up.

Copyright: Text was displayed at the meeting

Minutes of pervious meeting: Unanimously approved with motion brought forward by Barrett Wimberly and seconded by Pat Rock.

Agenda: The agenda was presented. Unanimous approval was granted with motion brought forward by Thomas Sizemore and seconded by David Wallace.

Zoltan reviewed the status of the Comment Resolution Group (CRG), the Web meeting membership and asked for volunteers to do the editorial comment revisions. Also, after a brief discussion it was decided to request another one-year PAR extension.

Starting at about 8:15 Zoltan started to discuss and resolve items that were deferred for this in-person meeting. Record 507 was ACCEPTED after discussion. Related to that, Zoltan commented on his IEC work and that they wanted to use Table 13 Transient Response Classes from Section 7.3.

A couple more line items were dealt with until record 515 led to much discussion about metering versus protection application by class. Time ran out; the issue could not be resolved in this meeting.

Dave Wallace, Thomas Sizemore, Mike Craven and Andre Rottenbacher volunteered to help with editorial comment resolution.

Motion to adjourn: The meeting adjourned at 9:15 with no objections

Next Meeting: This WG will meet to continue work at the Kansas City, MO Fall 2023 meeting.

F.8 Old Business

Discussion on Taskforce to incorporate C57.13.5 into C57.13:

18 volunteers signed up for the taskforce. Zolton Roman, Steve Snyder and Huan Dinh worked between meetings. 5 virtual meeting were held. The taskforce and the initial goal of the team were not recorded in the minutes of the last meeting and some discussion was needed at this meeting.

The primary focus was should we incorporate the entirety of C57.13.5 in C57.13 or just portions. Huan Dinh presented and led the discussion. Listed the pros and cons of

performing this merger along with an alternative of just transferring material that is missing from the current draft of C57.13.

- Listed the technical differences between the two standards: PD and Power frequency voltage withstand
- Different procedures: Routine test with vs without impulse test
- Impulse type test
- Additional tests for C57.13: on both routine and type test

Huan discussed a spreadsheet showing significant differences between the two standards. Igor discussed the difference between class 1 and class 2, how do you decided which one to use. He feels that 115kV and above should be class 2 and follow C57.13.5.

Rudy discussed the customers using the standards and they do not specify either Class 1 or 2 but rather which standard to use. He feels we do not need to merge the standards.

Steve Snyder suggested that the units are not built differently based on the class but only different test sequences.

Ryan Hogg discussed what “class” brings up when doing a search for transformers. He feels that the word class should be removed.

Marek Koronoski feels that the standard will become too large and overshadow the low voltage class units. He would like to keep the standards separate. Zolton Roman did not see a problem with overshadowing.

Zolton Roman motioned to join the two standards and let C57.13.5 expire and Pat Rock seconded the motion. Options on the vote were as displayed below.

1. Completely consolidate C57.13.5 into C57.13
2. Update C57.13 with new material from C57.13.5
3. Keep them separated and referring to each other on related material as is.

Vote was held. 17 voted for the motion, 10 voted against and 3 abstained.

F.9 New Business

Kurt Kainider and Frank Neder discussed status on electronic instrument transformers. Digital substation, Low burden, power quality, Low Power ITs were discussed. Examples were shown of electronic CT assembly and optical CT assemblies. A list was provided of IEC standards currently in place and under consideration. Both presenters requested adding this information into the C57.13 family of standards. Huan Dinh suggested bringing in elements from IEC into the std. Jim McBride discussed the work being done by PSIM. Minimal discussion took place due to time limitations this discussion may be continued at the Fall meeting.

F.10 ITSC Adjournment

The meeting concluded and was adjourned after a motion by Pat Rock and seconded by Rudy Ogajanov at approximately 9:15 AM.

The next meeting is to be held in Kansas City, Missouri, USA, in the Spring of 2023.

Annex G Insulating Fluids Subcommittee

Mar 22nd, 2023

Milwaukee, WI – Hyatt Regency

Chair: Scott Reed

Vice-Chair: Jerry Murphy

Secretary: Alan Sbravati

1. Introductions, Roll Call of Members for Quorum, Meeting Agenda Approval, S21 Minutes Correction and Approval, and Chair's Comments

1.1 Chair's Opening Remarks:

- a. Presentation of the Vice-Chair, Jerry Murphy, and the Secretary Alan Sbravati.
- b. Reminded that the SC minutes are due May 5th, 2023- WG and TF meeting minutes are due for submittal to the Insulating Fluids Subcommittee (IFSC) Secretary Alan Sbravati due within 15 days of their meetings (Apr 4th, 2023).

1.2 Roll Call of SC members: (Quorum requirement: 26 minimum)

- a. 35 Members signed in, from a total of 46 members. Quorum was achieved.
- b. Total of 83 attendees. 32 Guests and 16 new attendees. Five guests requested membership, and two of them are eligible.
- c. Registered Attendance:

First Name	Last Name	Role	Roger	Hayes	Member
Juan	Acosta	Guest	Ronald	Hernandez	Guest
Kush	Arora	Guest	Andrew	Holden	Member
Kevin	Biggie	Guest	Traci	Hopkins	Guest
William	Boettger	Member	Karl	Jakob	Guest
Paul	Boman	Member	Patrycja	Jarosz	Guest
Mike	Bonn	Member	John	John	Member
Jeremiah	Bradshaw	Member	Christopher	Johnson	Guest
David	Calitz	Member	Kurt	Kaineder	Member
Juan	Castellanos	Member	Qasim	Khan	Guest
Stuart	Chambers	Member	Zan	Kiparizoski	Member
Anthony	Coker	Guest	Jason	Lambert	Guest
Roberto	da Silva	Guest	Chao	Li	Guest
Zachary	Draper	Member	Tiffany	Lucas, P.E.	Guest
Florin	Faur	Member	Stephanie	Mabrey	Member
Esseddik	F. Kherkhachi	Guest	Alejandro	Macias	Guest
Sanford	Fong	Guest	Jinesh	Malde	Member
Bruce	Forsyth	Member	Kumar	Mani	Guest
Rainer	Frotscher	Member	Kevin	Mazzei	Guest
Rob	Ghosh	Guest	Toni	Mellin	Guest
Luis	Gonzalez	Guest	Kent	Miller	Guest
Alireza	Gorzin	Guest	Justin	Minikel	Guest
Attila	Gyore	Member	Jerry	Murphy	Vice-Chair
Michael	Hall	Guest	Anthony	Natale	Guest
Robert	Harper	Member	Mark	Newbill	Guest

Ashmita	Niroula	Member	William	Solano	Guest
Tommy	Nunn	Guest	Brian	Sparling	Guest
Stephen	Oakes	Guest	Fabian	Stacy	Member
Anastasia	O'Malley	Guest	Markus	Stank	Guest
Tyler	Parenti	Guest	Gregory	Steeves	Member
Dwight	Parkinson	Member	Chris	Talbert	Guest
Miguel	Plascencia	Guest	Michael	Thibault	Guest
Daniel	Posadas	Member	Timothy	Tillery	Guest
Thomas	Prevost	Member	Mark	Tostrud	Guest
John	Pruente	Member	Evanne	Wang	Member
Scott	Reed	Chair	Zachery	Weiss	Guest
Sebastian	Rehkopf	Guest	William	Whitehead	Member
Patrick	Rock	Guest	Christopher	Whitten	Guest
Mickel	Saad	Member	Kevin	Wirtz	Guest
Lina	Sandsten	Guest	Deanna	Woods	Member
Alan	Sbravati	Secretary	Guang	Yuan	Guest
Jonathan	Sinclair	Member	Anand	Zanwar	Guest

1.3 Agenda Approval:

- a. A motion for approval of the agenda was presented by Tom Prevost, second by Jeremiah Bradshaw. Agenda was unanimously approved.
- b. Scott presented a reminder about the submission of minutes deadline and mandatory training for WG officers.

1.4 Approval of minutes from the F22 meetings:

- a. A motion for approval of the F22 minutes was presented by Tom Prevost, second by Jeremiah Bradshaw. Minutes were unanimously approved.

1.5 Chair's review of key IFSC Standards:

- a. The chair reviewed the status of each of the 10 guides under the Sub-Committee Insulating Fluids.
- b. C57.166 PAR's was extended to December 2024. This will supersede C57.106, C57.111, C57.121, C57.147, so no activity is required at this point for these standards.
- c. C57.155 will expire in 2024. C57.637, C57.130 and C57.139 will expire in 2025.
- d. C57.104 no activities during last 2 meetings (active PAR).
- e. C57.146, C57.155, C57.637 and C57.166 have active PAR's.
- f. C57.146 PAR will expire in 2024. PAR for C57.155 and C57.637 will expire in 2025. PAR for C57.130 and C57.139 will expire in 2026.

2. WG & TF Reports Presented at the SC Meeting

2.1.1 IEEE C57.166 Consolidation of Insulating Liquids Guides (PAR Expiration: Dec 2022)

2.1.1.1 WG Chair: Tom Prevost

2.1.1.2 The report of the WG Meeting was presented at the IFSC meeting by the chair:

- a. There were 28 of 40 members present. Total of 92 attendees, including 64 guests. A membership

quorum was achieved.

- b. Call for patents was presented without any claim.
- c. Chair informed the PAR goes until end of 2024, already counting the extension.
- d. The chair presented several remarks. The final version of the document does not include the word “consolidated” in the title, just Acceptance and Maintenance of Insulating Liquids.
- e. Ballot resolution group (BRG) already defined using the structure of the TF’s for resolving the comments from the straw ballot.
- f. The SA Ballot should be started after the IEEE SA MEC (mandatory editorial coordination).
- g. A few discussions happened regarding details of the text. Additional comments were requested to be submitted during the balloting process.

See *Appendix I* for the S23 Minutes (unapproved) of C57.166 WG Meeting as submitted.

2.1.2 IEEE C57.146 IEEE Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers

2.1.2.1 WG Chair: Paul Boman

- a. Attendance total 12, members 7, and 1 requested membership. The required WG quorum of 6 was present and business could be conducted at this meeting.
- b. Tiffany Lucas from Prolec-GE agreed to be the WG Secretary
- c. Call for essential patents – none at this time
- d. Copyright usage was discussed during the meeting
- e. Agenda – no additions were made to the agenda. Agenda was approved by unanimous approval.
- f. Copyright discussed – no copyright releases were discussed for the citation papers in the document
- g. Par expires dec, 2024
- h. A presentation from Claude Beuachemin was received and shared during the meeting.

See *Appendix II* for the S23 Minutes (unapproved) of C57.146 WG Meeting as submitted.

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

2.1.3.1 TF Chair: Claude Beauchemin

- a. The working group did not meet.

Appendix III has no minutes included.

2.1.4 C57.637 – Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use

2.1.4.1 WG Chair: Stephanie Mabrey

- a. The meeting was called to order at 11:00 am by Chair Stephanie Mabrey.
- b. The Working Group (WG) started the meeting with 29 members and 15 requests for memberships. After attendance was taken 30 of the 44 (68%) were present so quorum was reached.
- c. Task Force leaders introduced themselves and shared a brief update of any progress made to date.
- d. Task Force actions planned before the Fall 2023 (Kansas City) meeting:

- Each TF will begin completing their efforts and plan to submit their portions in advance of the next meeting
 - Any questions, comments, concerns, or needs should be brought to the attention of the Chair and Secretary in the interim
- e. With no other business to address the meeting was adjourned by the Chair at 11:56 am

See *Appendix IV* for the S23 Minutes (unapproved) of C57.637 WG Meeting as submitted.

2.1.5 C57.155 – Guide for Interpretation of Gases Generated in Natural and Synthetic Ester Liquid Type Transformers

2.1.5.1 WG Chair: Alan Sbravati

- a. There were 19 of 25 members present during the meeting. There were 50 guests, 14 membership requests. The quorum was achieved.
- b. No patent claim nor copyright issue were presented.
- c. Activities after F22 meeting was presented on data collection
- d. Discussion on data collection and data storage by IEEE
- e. TF meetings were held about Normalized Energy Index
- f. Task Force 2. 2 presentations were given on Normalized Energy Index
 - Russell Martin developed NEI parameters for Synthetic Ester liquids, presented by Attila Gyore
 - Kevin Wirtz developed and presented NEI parameters for Natural Ester liquids.
- h. Meeting was adjourned at 16:29

See *Appendix V* for the S23 Minutes (unapproved) of C57.155 WG Meeting as submitted.

2.1.6 Working Group C57.139 – Guide for the Interpretation of Gases generated in Liquid Type Load Tap Changers

2.1.6.1 WG Chair: Rainer Frotscher

- a. Total: 55, Members: 14, Guests: 41, with 18 requesting membership. Quorum was achieved.
- b. F22 Meeting Minutes - unanimous approval
- c. Essential patent claims: none stated; Copyright requirements were shown.
- d. Task force leaders reported the progress.
- e. Chair presented List of Transformer manufacturers, some of them also produce LTCs.
- f. Second list presented of LTC manufacturers and model types, with IEEE and CIGRE classification. List will help to anonymize origin of data sets
- g. Chair explained the Data Hosting and Anonymization Process which has been set up together with IEEE SA during the winter months
 - Concerns from potential data providers against individual WG members who have access to the anonymized data were discussed
 - A first Call for Data has been sent out on Feb 22 to 47 members and guests of the WG. Up to now, only one data set was received

j. Meeting adjourned 5:59 pm

See *Appendix VI* for the S23 Minutes (unapproved) of C57.139 WG Meeting as submitted.

2.1.7 Working Group C57.130 – Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors

2.1.7.1 WG Chair: Bruce Forsyth

a. The WG met on Tuesday, March 21, 2023 but did not have a quorum

Most of the meeting was spent identifying the data desired for a survey of manufacturers to gather information to substantiate the gas generation rate limits during factory temperature rise tests for mineral oil that are in the existing document, as well as information that can be used to develop the corresponding gas generation rate limits for natural and synthetic ester liquids. A small task force will create a survey proposal. Our goal is to have the survey developed and approved by the WG before the next meeting.

See *Appendix VII* for the S23 Minutes (unapproved) of C57.130 WG Meeting as submitted.

3. Old Business

a. Regarding the TF to develop a test method to determine the maximum continuous operating temperature of insulating liquids, Alan Sbravati reported that a new chair was selected, who is Ahmed Gamil, from Hitachi Energy. He will start calling conference calls for the TF activities and start attending the IEEE TC meetings from F23.

4. New Business

a. No new business.

5. Next IFSC Meeting:

Oct 22th, 2023 – Kansas City, MO

6. Adjournment

The meeting was adjourned at 3:30 p.m.

Respectively Submitted, Alan Sbravati, Secretary IFSC

Unapproved Minutes from the S23 IFSC WG and TF meetings

Appendix I

**Working Group for Acceptance and Maintenance of Insulting Liquids
PC57.166**

**Tuesday, March 21, 2023
1:45 – 3:00 PM
Hyatt Regency Milwaukee, WI**

Chairman Tom Prevost
Vice Chair Scott Reed
Secretary Alan Sbravati

The meeting was called to order at 1:48 pm by the Chair.

There were 28 of 40 members present. Total of 92 attendees, including 64 guests. A membership quorum was achieved.

Attendance list:

First Name / Last Name	Role		
Juan Acosta	Guest	Attila Gyore	Member
Kush Arora	Guest	Robert Harper	Member
Gilles Bargone	Guest	Roger Hayes	Member
Brian Baumann	Guest	Ronald Hernandez	Guest
Jason Beaudoin	Guest	Andrew Holden	Member
Barry Beaster	Guest	Derek Hollrah	Guest
Jean-noel Berube	Guest	Patricia Jarosz	Guest
Vivek Bhatt	Guest	Christopher Johnson	Guest
Kevin Biggie	Guest	Zan Kiparizoski	Member
William Boettger	Guest	Rafal Kowalski	Guest
Dominique Bolliger	Member	Krzysztof Kulasek	Guest
Paul Boman	Member	Aleksandr Levin	Member
Mike Bonn	Member	Lance Lewand	Guest
Jeremiah Bradshaw	Member	Chao Li	Guest
Samuel Brodeur	Guest	Stephanie Malbrey	Member
Edward Casserly	Member	Brian McBride	Guest
Juan Castellanos	Guest	Toni Mellin	Guest
Stuart Chambers	Member	Kent Miller	Guest
Vivian Chan	Guest	Justin Minikel	Guest
Roberto da Silva	Guest	Abbas Mubarah	Guest
Sami Debass	Guest	Ismael Naja	Guest
Jeffrey Door	Guest	Ashmita Niroula	Member
Zachary Draper	Guest	Anastasia O'Malley	Guest
Jesse Duffy	Guest	Parminder Panesar	Member
Qusai Elnimri	Guest	Tyler Parenti	Guest
Todd Felton	Guest	Nicholas Perjanik	Member
George Frimpong	Guest	John Prunte	Guest
Rainer Frotscher	Member	Bradley Rainbolt	Guest
Lorne Gara	Guest	Scott Reed	Vice-Chair
Miguel Garcia	Guest	Diego Robalino	Member
James Gardner	Member	Patrick Rock	Member
Ismail Guner	Member	Chris Rutledge	Guest
Niklas Gustavsson	Guest	Mickel Saad	Member

Lina Sandsten	Guest	Christopher Sullivan	Guest
Anil Sawant	Guest	Troy Tanaka	Guest
Alan Sbravati	Secretary	Jacob Thielbar	Guest
Alaor Scardazzi	Guest	Evanne Wang	Member
Pugal Selvaraj	Member	Zachery Weiss	Guest
Jaber Shalabi	Guest	Elliot White	Guest
Mike Shannon	Guest	William Whitehead	Guest
Jonathan Sinclair	Member	Christopher Whitten	Guest
Muhammad Sohail	Guest	Deanna Woods	Guest
Mauricio Soto	Guest	Guang Yuan	Guest
Brian Sparling	Guest	Malia Zaman	Guest
Thomas Spitzer	Guest	Gabriel Delgado Zamora	Guest
Gregory Steeves	Member	Anand Zanwar	Guest

Approval of Agenda

- Motion for approving agenda presented by Diego Robalino and second by Jeremiah Bradshaw.
- Agenda unanimously approved.

Approval of Spring 2022 Minutes

- Motion for approving the minutes presented by Dominique Bolliger and second Ed Casserly.
- No discussions, minutes unanimously approved.

The chair presented the slides on the Call for Patents and no claims of essential patents was presented.

The chair presented the slides on Copyright Policy, also informing the participants the overall IEEE procedures for the meeting.

Chair's remarks

Chair informed the title was adjusted, removing the word “consolidated” and being just Acceptance and Maintenance of Insulating Liquids.

This will potentially be the last meeting of the working group, as the intention is to vote for starting the balloting process for the standard. Invitation for joining the ballot will be open for 30 days, attendees must keep watching for that. After this meeting the text will be sent to the IEEE SA MEC (mandatory editorial coordination) and the ballot will be started.

A Ballot Resolution Group will be formed after the balloting. As approved in F22 meeting, the BRG will be formed by the task group leaders.

Jeremiah asked for the final draft to be distributed to the group. Tom replied this may create confusions with the documents versions if the draft is shared in parallel with the MEC. As the Ballot is about to be started, it would be better to have the revision during the balloting.

A few edits were included in the text during this meeting

- Revision of the purpose was discussed and approved but not incorporated into the draft. The chair will make that correction as he updates the abstract and introduction.
- Section 11.5.5 was removed, for already included in the Standard 637
- Scott raised a topic regarding the table 4 of the document, where there is a typo on the indication of $\geq 69\text{kV}$ and it should be $\leq 69\text{kV}$

- Jeremiah raised a discussion regarding the last item of table 3, where it says the total gas content should be lower than 0.5% (5,000ppm). The explanation that the percentage refers to the “% in volume”, this word was added.
- A question was raised about the switchgears, which was in the scope of C57.106. The subject belongs to a different committee and, due to this, it was removed from here.

Motion for the Ballot to start was presented by Stu Chambers and seconded by Diego Robalino

No new business.

Meeting adjourned at 2:46pm

Alan Sbravati, Secretary

Scott Reed, Vice Chair

Appendix II

Working Group C57.146 IEEE Guide for DGA in Silicone

**Monday, March 20, 2023
11:00 AM to 12:15 PM
Hyatt, Milwaukee, WI, USA
Minutes of Working Group Meeting**

Chair Paul Boman / Vice Chair Lance Lewand

Secretary Vacant – filled by Tiffany Lucas of Prolec GE at start of meeting

Meeting on March 20, 2023, 11:00 AM to 12:15 PM at Hyatt, Milwaukee, WI, USA

Attendance total 12, members 7, and 1 requested membership. The required WG quorum of 6 was present and business could be conducted at this meeting.

Meeting Attendance

Role	First Name	Last Name	Company
Chair	Paul	Boman	Hartford Steam Boiler
Member	Florin	Faur	Prolec-GE
Guest	Rainer	Frotscher	Reinhausen.Com Energy
S23 *	Traci	Hopkins	H2 Scan
Vice-chair	Lance	Leward	Doble Engineering Co.
Secretary	Tiffany	Lucas	Prolec-GE
Guest	Nick	Perjanik	Weidmann-Group
Member	Scott	Reed	MVA
S23 *	Mauricio	Soto	Hitachi Energy
Guest	Greg	Steeves	Baron
Guest	Risto	Trifunski	Trench-Group
Member	Bill	Whitehead	H2Scan.Com Energy

* Requesting Membership

Tiffany Lucas from Prolec-GE agreed to be the WG Secretary

Agenda – no additions were made to the agenda. Agenda was approved by unanimous approval @11:06am CST.
All – aye, abstentions – none.

Agenda

- Welcome
- Approval of Agenda
- Membership / Quorum
- Call for Patent Claims / IEEE SA Copyright Policy
- Combustible Gas Table Revision
- Document revision
- Case Studies
- Adjourn Meeting

Call for essential patents – none at this time

Fall 2022 Working Group Minutes were motioned for approval by Scott Reed with a 2nd by Lance Lewand.

Copyright discussed – no copyright releases were discussed for the citation papers in the document
Par expires Dec, 2024

PowerPoint Presentation from Claude Beauchemin and the file is included at the end of the Meeting Minutes.

Comments on Data

2005 guide, new tables March 2023

6 data sets supplied

164,515 DGA total

24,795 transformers

17,795 had 2 sets of data per transformer

89,194 DGA with the manufacture year info

144,816 DGA with rating information

No online DGA, all lab based sample data is provided.

Reviewed: date, MVA, years, 'free breathing' (leaking) or sealed, gas blanketed or not gas blanketed, O2 ratio.

Vote on parameters O2/N2 ratio

High > 20% 'breathing' = leaking

Low < 20%

If sealed absolute value of N2 - Rainer

Low O2, high N2 = sealed

If no N2 blanket, just air blanket – high O2

Claude does not have code to define data – proportion of accuracy sealed/not sealed

Ethane correlates to O2 ratio – 7 data sets = 5 data sets + 2 recent data set submittals.

As unit ages H2 values decrease. Breathing (leaks) less H2 due to leaking. – Scott

Needs note in verbiage to explain

Clarify with Claude: transformer age in years based on transformer vs sample age? – Paul will send email to Claude

Sampling of problem units with repeat samples would skew the results in the data set.

** it is important to note that these are all sealed transformers, not breathing**

Age of transformer was when sample was drawn? – Rainer

Table 1 – 90th percentile – warning level

Table 2 – 95th percentile – alarm level

Ostwald coefficient will be included in Annex similar to current Guide

"Any" column in Table 1 data set change to "unknown"

Per Paul, threshold values look similar to 95th percentile

Flow chart: make C57.146 or like C57.104 change from the 2005 revision.

Mimic the C57.104 flow chart as close as possible – Scott Reed

Don't change the flow chart unless we have to for the sake of the labs programming – Nick

Do we know that we can stand behind the data in the tables? Don't change unless 100% sure.

Copyright release for Case Study is on-file

Case study Annex will be used – Paul

Solubility vs fluid temp data and add additional historic data to case study?

Paul will add IR pic of radiator into Case Study

Should have additional case studies from Doble along with Copyright release

Action items

Confirm with Claude xfmr age in years based on xfmr vs sample age?

Paul make one page to compare table 1 and table 2 on same page

Align flowchart with C57.104

Add case study to annex
Paul to add IR pic of radiator

Adjourned Meeting

Following the Meeting adjourning, Claude answered that Table 1 age segment is based on difference between the individual sample data and transformer age.

Appendix III

TF Next Revision to C57.104: Guide for Interpretation of Gases Generated in Mineral Oil-Immersed

No meeting minutes

Appendix IV

Working Group C57.637 Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use

Tuesday March 21, 2023

11:00 AM – 12:15 PM

Milwaukee

Minutes of Working Group Meeting

The meeting was called to order at 11:00 am by Chair Stephanie Mabrey.

Attendees:

The following list attended the meeting in person.

1. Juan Acosta	16. Ismail Gunar
2. Kevin Biggie	17. Bob Harper
3. Paul Boman	18. Andy Holden (Secretary)
4. Mike Bonn	19. Lance Lewand
5. Jeremiah Bradshaw	20. Staphanie Mabrey (Chair)
6. Ed Casserly	21. Jinesh Malde
7. Stuart Chambers	22. Ashmita Niroula
8. James Cross	23. Tyler Parenti
9. Roberto Da Silva	24. Scott Reed (Vice -Chair)
10. Jesse Duffy	25. Mickel Saad
11. Samrani Dutta Roy	26. Alan Sbravati
12. Todd Felton	27. Jonathan Sinclair
13. Marc Foata	28. Greg Steeves
14. George Frimpong	29. Ed teNyenhuis
15. Rainer Frotscher	30. Deanna Woods

Membership:

The Working Group (WG) started the meeting with 29 members and 15 requests for memberships. After attendance was taken 30 of the 44 (68%) were present so quorum was reached.

Before the next meeting 5 members and 8 of those requesting membership will be identified as guests. The resulting roster will be 31.

1. Juan Acosta	10. Roberto Da Silva	19. Andy Holden
2. Kevin Biggie	11. Jesse Duffy	20. Lance Lewand
3. Paul Boman	12. Samrani Dutta Roy	21. Staphanie Mabrey
4. Mike Bonn	13. Todd Felton	22. Jinesh Malde
5. Jeremiah Bradshaw	14. Marc Foata	23. Ashmita Niroula
6. Ed Casserly	15. George Frimpong	24. Tyler Parenti
7. Stuart Chambers	16. Rainer Frotscher	25. Scott Reed
8. Larry Christodoulou	17. Ismail Gunar	26. Mickel Saad
9. James Cross	18. Bob Harper	27. Alan Sbravati

28. Jonathan Sinclair
29. Greg Steeves

30. Ed teNyenhuis
31. Deanna Woods

Agenda

- 1) Introduction
- 2) Review Copyright IEEE SA Notification
- 3) Review Call for Patents
- 4) Introductions
- 5) Obtain Quorum
- 6) Approval of prior minutes
- 7) Introduction of Task Force leaders and updates

Chair's Remarks:

Chairwoman Mabrey (SM) requested a call for patents and no claims were made.

Next, the Chair reviewed with the Task Force (TF) the IEEE's copyright policy, of which no comments were made.

SM encouraged the Task force leaders to focus on submitting their section draft before the Fall meeting.

Introductions were made by all in attendance.

Quorum was confirmed by AH. SM informed the group that we will freeze the membership list as-is since we are approaching the consolidation phase. SM reminded all in attendance that members and guests will all have the ability to offer comments during the upcoming review phase.

Approval of Minutes:

It was noted that the minutes for prior meetings were not posted on the website. Secretary Andy Holden (AH) will address this in advance of the Fall meeting.

SM asked for comments about meeting minutes and after seeing none SM offered a motion to approve the minutes from Spring 2022 and Fall 2022 as offered.

Mickel Saad (MS) offered the motion as offered, seconded by Ed Casserly (ES). The motion carried with no objections or abstentions.

Task Force Reports:

The Chair then asked each Task Force leader to introduce themselves and share a brief update of any progress made to date. The following Task Forces leaders presented.

- Task Force 1 – Overview, Normative References, & Definitions
 - Jeremiah Bradshaw
- Task Force 2 – Classification of Service Aged Oils (Liquids) & Criteria for Reuse
 - Jinesh Malde
- Task Force 3 – Types of Reconditioning & Reclamation Processes
 - Ed teNyenhuis

- Task Force 4 – Oil (liquid) Tests & Their Significance
 - Andy Holden
- Task Force 5 -- Editor at Large
 - Jinesh Malde & Ed teNyenhuis

Task Force 1 Update

- The group continues to work in parallel to the other task forces and expects to be able complete their section once the others have submitted.

Task Force 2 Update

- They continue to make progress and have the resources necessary to continue forward to completion.
- They have realize that some of the older figures around mineral oil need some attention and updating.

Task Force 3 Update

- Work is nearly complete, and they will be ready to submit before the Fall 2023 meeting
- Discussion was offered by Stuart Chambers (SC) about the updates to the ester tables in this section.
 - Topics of interest include inhibitor depletion and replenishment, moisture levels, and ester chain length and it's impact to durability of the oil
- Juan Castellanos (JC) inquired about how proprietary additives of esters will be measured and gain assurance of their presence in reconditioned oil

Task Force 4 Update

- Work is nearly complete, and they will be ready to submit before the Fall 2023 meeting

Task Force 5 Update

- No update

Task Force actions planned before the Fall 2023 (Kansas City) meeting:

- Each TF will begin completing their efforts and plan to submit their portions in advance of the next meeting
- Any questions, comments, concerns, or needs should be brought to the attention of the Chair and Secretary in the interim

General Discussion:

With no other business to address the meeting was adjourned by the Chair at 11:56 am.

Appendix V

Working Group C57.155 – Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers

**Tuesday, March 21, 2023
15:15 – 16:30, Milwaukee, WI, USA
Minutes of Working Group Meeting**

Chairman: Alan Sbravati
Vice Chair: Lance Lewand
Secretary: Attila Gyore

The meeting was called to order at 15:18 by the Chair.

There were 19 of 25 members present during the meeting. There were 50 guests, 14 membership requests.
The quorum was achieved.

1. Attendance list:

Juan	Acosta*	Guest	Traci	Hopkins*	Guest
Carlos	Alonso	Guest	Karl	Jakob	Guest
Elise	Arnold	Member	Kurt	Kaineder	Member
Kush	Arora	Guest	Andrew	Larison	Guest
Brian	Baumann	Guest	Junho	Lee	Guest
Kevin	Biggie	Guest	Soyaung	Lee	Guest
Paul	Boman	Member	Aleksandr	Levin	Guest
Mike	Bonn	Guest	Lance	Lewand	Vice-Chair
Jeremiah	Bradshaw	Member	Chao	Li*	Guest
David	Calitz	Member	Tiffany	Lucas	Member
Edward	Casserly	Member	Yuri	M Rossini	Guest
Stuart	Chambers	Member	Jinesh	Malde	Member
Anthony	Coker	Guest	Toni	Mellin	Guest
Roberto	Da Silva	Guest	Hugo	Murillo	Guest
Huan	Dinh*	Guest	Jerry	Murphy	Guest
Zack	Draper	Member	Ashmita	Niroula	Member
Quasi	Elnimri	Guest	Rudolf	Ogajanov	Guest
Florin	Faur*	Guest	Jonas	Oliveira	Guest
Todd	Felton*	Guest	Anastasia	O'Malley	Guest
Sarford	Fong	Guest	Parminder	Panesar	Member
George	Frimpong	Member	Tyler	Parenti	Guest
Rainer	Frotscher*	Guest	Vinay	Patel	Member
Miguel	Garcia	Guest	Nick	Perjanik*	Guest
James	Gardner	Guest	Igor	Persinec	Guest
Alireza	Gorzin	Guest	Lina	Sandsten	Guest
Attila	Gyore	Secretary	Amitabh	Sarkar*	Guest
Robert	Harper	Member	Anil	Sawant*	Guest
Andrew	Holden	Guest	Alan	Sbravati	Chair

Markus	Schiessl	Guest	Chris	Talbert	Guest
Jaber	Shalbi	Guest	Evanne	Wang*	Guest
Muhammad	Abdullah Sohail*	Guest	Zachery	Weiss*	Guest
Mauricio	Soto*	Guest	Deanna	Woods*	Guest
Markus	Stank	Member	Kevin	Wirtz	Guest
Greg	Steeves	Guest	Fei	Yang	Guest
Ali	Syed	Guest			

*membership requested

2. Agenda for approval

A. Welcome & Introduction

B. Attendance and Establishment of Quorum

C. Call for Patent Disclosure

D. IEEE Copyright Policy

E. Approval of Fall 2022 Minutes

F. Working Group Activities

1. Task Force 1

- IEEE database: Alan Sbravati

2. Task Force 2:

- Development of NEI parameters for Synthetic Ester liquids: Attila Gyore

- Development of NEI parameters for Natural Ester liquids: Kevin Wirtz

G. Discussions:

H. Other Items for Discussion

I. Adjournment

3. Chair posted the Patent Claim. No claims were made.

4. Chair presented the copyright policy slides.

5. The agenda of the meeting was presented by the chair.

6. Quorum was checked, 15 members out of 25 were present at the time of check, quorum was achieved. Must attend 2 of the last 3 meetings to maintain membership.

7. Agenda for Spring 2023 was approved, motion: Jeremiah Bradshaw, second: Stuart Chambers

8. Fall 2022 Minutes was approved, motion: Ed Casserly, second: Jeremiah Bradshaw

9. Chair gave a short summary on activities from last meeting in October 2022

9.1 Discussion on data collection and data storage by IEEE

IEEE would create a platform to collect and store data. IEEE would anonymize the data and then forward them to the working group.

We will create procedure that is a translator and want the fields to comply with a specific procedure. Will run a python procedure to standardize the format of the data. It will convert the native database into a CSV file and then the owner of the data will send to IEEE.

There was some concern for those people reviewing the data will learn from the data and use it to their benefit whereas others won't have the opportunity.

9.2 3 TF meetings were held about Normalized Energy Index

10. Task Force 2. 2 presentations were given on Normalized Energy Index

10.1 Russell Martin developed NEI parameters for Synthetic Ester liquids, presented by Attila Gyore

10.2 Kevin Wirtz developed and presented NEI parameters for Natural Ester liquids.

11. Task Force 1. Reviewing the questionnaire's structure and columns

New columns were asked to introduce: BIL level, in-tank OLTC, DETC, reverse switch, when the sample was taken during FAT (however C57.155 is about in-service liquids), standard temperature, gas sampling method as per IEC 60567 or ASTM, temperature of water content, online/offline data.

12. The Task Force meetings between Committee meetings is open for new contributors. During the meeting 3 people indicated their present:

- Roberto Da Silva
- Mauricio Soto
- Jeremiah Bradshaw.

13. New Business/Other Items for Discussion: No new business.

14. The meeting was adjourned at 16:29, on time, motion: Jeremiah Bradshaw, second: Ed Casserly

Attila Gyore, Secretary

Alan Sbravati, Chair

Appendix VI

WG C57.139 – Guide for Interpretation of Gases Generated in Liquid Type Load Tap Changers

**Tuesday, Mar 21, 2023
4:45 PM to 6:00 PM
Milwaukee (WI)**

Chair Rainer Frotscher

Vice Chair John Prunte

Secretary Paul Boman

Meeting: Milwaukee (WI), Tue Mar 21 2023, 4:45 – 6:00 PM

Attendance record: Total: 55, Members: 14, Guests: 41, with 18 requesting membership.

Attendees list:

First Name	Name	Affiliation	Status/ Membership Request
Alex	Alahmed	Evergy	Guest ^{*)}
Paul	Boman	The Hartford Steam Boiler	Secretary
Elizabeth	Bray	Southern Company	Guest
Jorge	Canto	Alliant Energy	Guest ^{*)}
Edward	Casserly	Ergon	F22
Juan	Castellanos	Prolec GE	Guest
Roberto	da Silva	Cargill	Guest
Paolo	Dezi	EMID	Guest
Zachary	Draper	Delta-X Research	S22
Jesse	Duffy	Nashville Electric Service	F22
Hakim	Dulac	APT	Guest
Samraghi	Dutta Roy	Siemens Energy	F22
Florin	Faur	Prolec SPX Waukesha	S22
Todd	Felton	MVA Diagnostics	Guest ^{*)}
Hugo	Flores	Hitachi Energy	S22
Marc	Foata	MR	Guest
Rainer	Frotscher	MR	Chair
Hector	Garza	Orto de Mexico	Guest
Niklas	Gustavsson	Hitachi Energy	S22
Attila	Gyore	M&I Materials	F21

Traci	Hopkins	H2Scan	Guest
Olivier	Lejay	Huaming TC	F21
Tiffany	Lucas	Prolec SPX Waukesha	Guest *)
Stephanie	Mabrey	Weidmann	F22
Jinesh	Malde	M&I Materials	Guest
Toni	Mellin	Vaisala	F22
Juliano	Montanha	Siemens Energy	Guest
Emilio	Morelas Cruz	Qualitrol	Guest
Martin	Munoz	Orto de Mexico	Guest *)
Mark	Newbill	Hitachi Energy	Guest
Anastasia	O'Malley	Consolidated Edison Co.	Guest
Tyler	Parenti	Cargill	Guest *)
Nick	Perjanik	Weidmann	F21
John	Pruente	Prolec SPX Waukesha	Vice-Chair
Scott	Reed	MVA Diagnostics	F21
Perry	Reeder	GE Power Transformer	S22
Sebastian	Rehkopf	MR	F22
Christopher	Rutledge	Dynamic Ratings	Guest *)
Mickel	Saad	Hitachi Energy	Guest *)
Lina	Sandsten	Hitachi Energy	Guest *)
Alfons	Schrammel	Siemens Energy	Guest
Jonathan	Sinclair	PPL Electric utilities	S22
William	Solano	Reinhausen Mfg.	F22
Brian	Sparling	Dynamic Ratings	Guest *)
Samuel	Tekle	WEG TX	Guest
Tim	Tillery	Howard Industries	Guest
Olivier	Uhlmann	Reinhausen Canada	Guest
David	Wallach	Duke Energy	Guest
Matthew	Webb	GE	S22
Bill	Whitehead	H2Scan	F21
Christopher	Whitten	Hitachi Energy	F21
Deanne	Woods	Alliant Energy	Guest
Jeffrey	Wright	Duquesne Light	Guest
Joshua	Yun	Virginia Transformer Corp.	F22
Anand	Zanwar	Siemens Energy	Guest

*) : requesting membership

Agenda

Topics:

- Welcome

- Approval of Agenda
- Membership / Quorum
- Call for Patent Claims / IEEE SA Copyright Policy
- Approval of Meeting Minutes F22
- Database Hosting and Processing
- Data Providers
- Goals and Concerns
- Revision of C57.139 Document – Task Forces
- Adjourn Meeting

Minutes

1. The WG met Tue, Mar 21, 4:45 pm. Chair asked for approval of the agenda; motion by Hugo Flores, 2nd by Paul Boman => agenda was unanimously approved.
2. Chair showed membership list containing 24 members, with 14 attending => Quorum was achieved.
3. Chair asked for Essential Patent Claims => none stated.
4. IEEE Copyright Policy was shown.
5. Fall 2022 Meeting Minutes: motion to approve by Hugo Flores, 2nd by Bill Whitehead => unanimous approval.
6. To begin the revision of the 2015 Guide, 4 Task Forces were set up. Chair proposed and explained the respective working fields of the Task Forces and asked for volunteers.

▪ TF1: LTC DGA Data evaluation (in collaboration with IEEE SA Tools and Data Group)

Tasks:

- collect and evaluate representative data (focus on bolt-on types; in-tank models will be briefly considered)
- IEEE will collect, classify and anonymize data and submit them to the TF.
- Evaluation of data (normal / thermal fault / arcing fault / sparking/PD fault, no information).
- Development of suitable (statistical) methods.
- Results shall be evaluated, refined and verified, and finally handed over to TF4.

Leader: Zachary Draper (DeltaX Research)

Contributors: Samraghi Dutta Roy (SIEMENS Energy), Joahua Yun (Virginia Transf.),
Cole VanDreel (ATC), Lina Sandsten (Hitachi Energy), Toni Mellin (Vaisala, added Apr 4)

▪ TF2: Revision of Chapter 1 – 4 (General Section)

Tasks:

- Variety of different LTC architectures shall be described.
- Consideration of vacuum type LTCs shall be improved.
- New section on LTC faults, which are detectable by DGA, shall be added.

Leader: Florin Faur (Prolec SPX Waukesha, added Mar 22)

Contributors: Bill Whitehead (H2Scan), Christopher Whitten (Hitachi Energy),
Rainer Frotscher (Reinhausen)

▪ TF3: Revision of Chapter 5 (Applied Norms and Basic Rules)

Tasks:

- verify current Norms and Rules.
- propose a uniform way for collecting data.
- explain the significance of supplemental data, like op count, oil age etc.
- Set up new Annex with comprehensive Table of LTC manufacturers/models and their classification,
- add 5th letter for classification: “I” for in-tank, “O” for on-tank (compartment type LTC models)
- list and explain parameters which influence DGA => explains need for additional information
- give typical value ranges for existing gas ratios (from database evaluation, see TF1)

Leader: Deanna Woods (Alliant Energy)

Contributors: Stephanie Mabrey (Weidmann), John Prunte (Prolec SPX Waukesha, added Mar 22),
Rainer Frotscher (Reinhausen)

▪ TF4: Revision of Chapter 6 (Interpretation of LTC DGA Data)

Tasks:

- calculate 90/95% normal values for major LTC classes, using the results from TF1.
- add an evaluation flowchart, similar to C57.104.
- give recommendation how to group data.
- make Duval Triangle 2 normative.

Leader: William Solano (Reinhausen Mfg)

Contributors: Florin Faur (Prolec SPX Waukesha), Niklas Gustavsson (Hitachi Energy),
Christopher Whitten (Hitachi Energy), Cole VanDreel (ATC)

- The work of the Task Forces should be finished by Mid of 2024, so that a complete draft document is ready Fall 2024 to start the Balloting process.
7. Chair then explained the Data Hosting and Anonymization Process which has been set up together with IEEE SA during the winter months. All data shall be sent to c57data@ieee.org, which is a special IEEE email address set up for DGA data collections. IEEE will anonymize and classify the data and provide them in anonymized form to TF1. Alternatively, IEEE offers to also run all statistical evaluations on the data, based on adequate scripts provided by TF1, and then sends back the results only. With this, the WG never gets access to the raw data. Questions arose if this method is practicable. IEEE will store the data in a secure database long-term so that they will be available for the next revision of the Guide.
 8. Concerns from potential data providers against individual WG members who have access to the anonymized data were discussed, because they could use the data or the knowledge gained from the evaluation of data for their own purposes. While using the data outside IEEE is against the rules, the outflow of the knowledge must be accepted.
 9. A first Call for Data has been sent out on Feb 22 to 47 members and guests of the WG. Up to now, only one data set was received => Further calls will be initiated.
The appearance of the invitation shall be revised:
 - The Research Protocol Statement (kind of NDA) shall get an IEEE letterhead and signed.
 - The Database Template shall be simplified (reduced number of data fields required), as some data like date of last oil change or operation count will hardly be available. Anyway, waiving of this information will hamper data evaluation and increase inaccuracy.
 10. David Wallach (Duke Energy) emphasized that some utilities have switched from time-based to condition-based LTC maintenance, which means that the date of last oil change does not match with the date of DGA sampling. And LTC operation counts are usually not recorded when a DGA sample is drawn.
 11. Florin Faur proposed to use “reactance” and “resistance” instead of “reactor” and “resistor” type LTCs to ensure correct terminology. This should be in accordance with C57.131 where the same issue is currently being discussed.
 12. Meeting was adjourned at 5:59 pm.

Amendment:

At the IF subcommittee meeting on Mar 22, a call for participation in the TFs was made, but nobody volunteered.

Appendix VII

Working Group C57.130 – Guide for the Use of Dissolved Gas Analysis Applied to Factory Temperature Rise Tests for the Evaluation of Mineral Oil-Immersed Transformers and Reactors

Tuesday, March 21, 2023
9:30 – 10:45 am
Hyatt Regency Hotel, Milwaukee, WI

Minutes of Working Group Meeting

Chair: Bruce Forsyth

Vice Chair: Jinesh Malde (Secretary)

Quorum requirement was 26 of 50 members. 16 members were present, so quorum not met. 21 guests requested membership.

Meeting Attendance:

Last Name	First Name	Status	Kazmierczak	Jerzy	Member
Forsyth	Bruce	Chair	Kiparizoski	Zan	Member
Malde	Jinesh	Vice-Chair	Kirchenmayer	Egon	Member
Arteaga	Javier	Member	Lewand	Lance	Member
Adams	Kayland	Member	Murray	David	Member
Aikens	Tom	Member	Musgrove	Ryan	Member
Almeida	Nabi	Member	Patel	Nitesh	Member
Alonso	Mario	Member	Patel	Sanjay	Member
Ansari	Tauhid	Member	Reed	Scott	Member
Antosz	Stephen	Member	Sahin	Hakan	Member
Arnold	Elise	Member	Sarkar	Amitabh	Member
Beaudoin	Jason	Member	Schrammel	Alfons	Member
Boettger	William	Member	Sinclair	Jonathan	Member
Bohrn	Josh	Member	Skinger	Kenneth	Member
Botti	Michael	Member	Som	Sanjib	Member
Bradshaw	Jeremiah	Member	Staley	Brad	Member
Calitz	David	Member	Thompson	Ryan	Member
Castellanos	Juan	Member	Tolcachir	Eduardo	Member
Chakraborty	Arup	Member	Varghese	Ajith	Member
Davis	Eric	Member	Varnell	Jason	Member
Debass	Samson	Member	Wallach	David	Member
Draper	Zachary	Member	Zemanovic	Kyle	Member
Faur	Florin	Member	Zibert	Kris	Member
Garcia	Eduardo	Member	Alahmed	Alex	Guest
Griesacker	Bill	Member	Benach	Jeffrey	Guest
Hollrah	Derek	Member	Biggie	Kevin	Guest
Jensen	Nick	Member	Bonn	Mike	Guest
Joshi	Akash	Member	Byrnes	Ryan	Guest

Carrizales	Juan Alfredo	Guest	Mushill	Paul	Guest
Christodoulou	Larry	Guest	Nesvold	Brady	Guest
Clarke	Allen	Guest	Nims	Joe	Guest
Coker	Anthony	Guest	Panesar	Parminder	Guest
Da Silva	Roberto	Guest	Parenti	Tyler	Guest
Demir	Yasin	Guest	Perjanik	Nick	Guest
Downey	Andy	Guest	Pinard	Matt	Guest
Faherty	Joe	Guest	Plascenga	Miguel	Guest
Felton	Todd	Guest	Powell	Chad	Guest
Gardner	James	Guest	Radbrandt	Ulf	Guest
Garza	Hector	Guest	Rainbolt	Bradley	Guest
Gonzalez	Luis	Guest	Rainer	Frostcher	Guest
Gupta	Mayur	Guest	Rehkopf	Sebastian	Guest
Gyore	Attila	Guest	Sbravati	Alan	Guest
Hakim	Shamaun	Guest	Sen	Cihangir	Guest
Harper	Robert	Guest	Shaikh	Salahuddin	Guest
Havens-Spillers	Bridget	Guest	Soto	Mauricio	Guest
Jakob	Karl	Guest	Sparling	Brian	Guest
Jordan	Steve	Guest	Speegle	Andy	Guest
Katapalli	Thrinadha	Guest	Steele	Hampton	Guest
Khan	Qasim	Guest	Steiger	Ethan	Guest
Krvavac	Jusuf	Guest	Steineman	Andy	Guest
Lee	Junho	Guest	Syed	Ali	Guest
Lee	Soyoung	Guest	Tillery	Tim	Guest
Li	Chao	Guest	Veeran	Kannan	Guest
Lucas	Tiffany	Guest	Vir	Dharam	Guest
Mamede	Gabriel	Guest	Weiss	Zachory	Guest
Mazzei	Kevin	Guest	Welton	Drew	Guest
Mcbride	Brian	Guest	Wirtz	Kevin	Guest
Mendez	Omar	Guest	Wright	Jeffrey	Guest
Morales-Cruz	Emilio	Guest	Yuan	Guang	Guest
Munoz	Martin	Guest	Yun	Joshua	Guest
Murphy	Jerry	Guest			

The Chair showed the IEEE patent and copyright policies and asked the participants if there are any claims that should be reported regarding these policies. There were no claims brought up by attendees in the meeting.

The agenda and meeting minutes presented to the attendees was not approved as quorum was not met. Minutes of Fall 2022 and Spring 2023 will be sent by email to the members for approval prior to Fall meeting. The roster will be updated prior to Fall 2023 to improve the attendance requirement to meet quorum.

The scope and purpose were presented in the meeting and the Chair mentioned that the scope and purpose currently only focuses on mineral oil but may include esters depending on the data collected by the working group (WG).

WG milestones were presented. Substantive work needs to be completed by Fall 2024 so that the guide can be submitted to ballot in the Fall of 2024. Final submission of approved document is Fall 2025.

The Chair updated the group on the collection of data for analysis by the WG:

- To collect data on all insulating liquids, the sources would mainly be transformer OEMs or Users.
- Four separate groups in IEEE transformer committee are looking to collect dissolved gas analysis (DGA) information, and a common survey was proposed by IEEE to be sent to the groups. The purpose for IEEE to collect the information was to assure anonymity and safekeeping of raw data.
- It was agreed that IEEE would be the keeper of the raw data (for future use). This would be for continuous updating of the standards.
- Limited number of WG members will review and “scrub” the data:

- Harmonize terminology
 - No fundamental data changes
- Data asked would be for mineral oil and esters. Mineral oil data will be requested since there is limited information on past data used to develop the mineral oil charts.

Lance Lewand's taskforce reviewed what data would be asked for the survey. The list of survey questions was presented to the group. The WG provided the following input:

- James Gardner asked for BIL information to be used rather than kV. He also proposed to ask whether LTC liquid mixes with main tank liquid. If they mix, a different section would be needed.
- Alan Sbravati proposed asking whether dielectric test was performed before heat run test or after heat run test. Also ask stages when heat run test was done e.g ONAN, ONAF.
- Zan Kiparizosky ask to add when DGA was performed (before heat run or after).
- Egon Kirchenmayer – DGA about overload condition, time of overload, how much the overload should be collected.
- Nick Jensen – The temperature and length of time for overload is important.
- Joshua Yun mentioned that the scope should be clear. It should be clear on type of transformers as well. Include the size of the units (10MVA, 69kV).
- Bruce Forsyth stated that it is important to get information on how long the heat run is done not when the samples was collected.
- Dharam Vir mentioned that the hot spot temperature should be included and BIL is more important than kV.
- Lance Lewand asked if C3&C4 gases are important? This is not requested by OEMs.
- Lance needs volunteers to go over survey. Lance is also collecting list of volunteer individuals/companies to agree to provide data.
- Samson Debass volunteered to help Lance review the data.

No new business

Meeting adjourned at 10:45 am

Insulation Life Subcommittee

March 22, 2023

Milwaukee, WI

Chair: Sam Sharpless

Vice-Chair: Jinesh Malde

Secretary: Anastasia O'Malley

The Insulation Life Subcommittee (ILSC) was called to order by the Chair on March 22, 2023, at 8:00 am EDT. The Chair introduced the subcommittee officers. 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 emphasized the timely completion, technical accuracy, and usefulness of quality projects through the participation of working group leaders, subject matter experts and the general membership.

The Chair emphasized that the final document structure and goals should be established as soon as possible. Working groups and task forces need to avoid scope creep. If new information arrives late, it should be documented in the minutes for the next revision. Working groups should conduct on-line meetings in between regular Transformer Committee meetings to move projects along. Efforts need to be made to avoid PAR extensions.

The Chair showed the essential patent claim notice and requested that any person with knowledge of an essential patent that meets the requirements of any subcommittee standard to bring the issue forward for discussion. No one responded to this request.

The Chair reviewed guidelines for IEEE working group meetings reminding compliance with all applicable laws, including antitrust and competition laws.

The Chair displayed the copyright policy and advised the subcommittee that permission would be required from the authors or organizations for use of information.

The Chair reviewed recently completed standards:

- C57.100 Standard Test Procedure for Thermal Evaluation of Liquid Transformers, completed in 2022
- C57.154 Standard for Liquid Transformers Designed to Operate at High-Temperatures, completed in 2022
- C57.169 Guide for Determination of Maximum Winding Temperature Rise in Liquid Transformers, completed in 2023

The Chair reviewed the status report of subcommittee activities:

- PC57.162 Draft Guide for the Interpretation of Moisture Related Parameters in Liquid Immersed Transformers and Reactors, currently in comment resolution, PAR expiration 12/31/2023
- PC57.165 Draft Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors, currently in SA ballot, PAR expiration 12/31/2023

- P1276a IEEE Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Distribution, Power and Regulating Transformers, Updating Annex B and corresponding reference in Annex D, PAR for amendment
- PC57.91 IEEE Guide for Loading Mineral-Oil Immersed Transformers and Step Voltage Regulators, PAR for revision 12/31/2023

The Chair discussed the membership requirements and welcomed new members: Nabi Almeida, Piotr Blaszczyk, Michael Botti, Hakim Dulak, Joseph Foldi, Orlando Giraldo, Ramadan Issack, Jerzy Kazmierczak, Mama Mbouombouo, Brian McBride, Daniel Posadas, Jarrod Prince, Hakan Sahin, Pugal Selvaraj, Cihangir (John) Sen, Zachery Weiss, Joshua Yun.

Former members Jorge Cruz, Everton De Oliveira, Eric Doak, Michael Franchek, Anthony Franchitti, Carlos Gaytan, Thomas Hartmann, Jon Karas, Darrell Mangubat, Anatoliy Mudryk, Paul Mushill, Aniruddha Narawane, Ion Radu, Jimmy Rasco, Jose Salva, Mark Shem-Tov, Craig Stiegemeier, Babanna Suresh, Robert Thompson, Richard vonGemmingen and Matthew Weisensee were moved to guest status.

H.2 Secretary's Report

The circulated attendance rosters reported that 80 out of 115 members were present in the meeting together with 106 guests. A quorum had been achieved. For the Spring 2023 Milwaukee meeting, only paper rosters were used, supplemented by a hand count during the meeting. Participants requesting membership for the subcommittee were advised to reach out to the Chair, Vice-Chair or Secretary at the conference, through email or to note it on the paper roster. Thirty-two guests requested membership. A list of attendees is provided at the end of this report.

The Fall 2022 subcommittee meeting minutes had been provided to participants in advance of the meeting for review. Ken Skinger made a motion to approve the minutes. David Wallach seconded the motion. After hearing no objection from the attendees, the Fall 2022 meeting minutes were approved by unanimous consent.

The agenda for the meeting had been provided to participants in advance of the meeting for review. Ed Casserly moved for approval of the agenda and it was seconded by Kevin Biggie. After hearing no objection from the attendees, the meeting agenda was approved by unanimous consent.

H.3 Taskforce Reports

H.3.1 Task Force C57.12.90 Clause 11, Temperature Rise Tests – Dinesh Sankarakurup, TF Chair presented the meeting minutes

ILFC TF Continuous Revisions to IEEE C57.12.90 Clause 11

Temperature-rise Tests

March 21st, 2023, Milwaukee, WI

TF - Temperature-rise Tests		
Chair: Dinesh Sankarakurup	Vice-Chair: Ajith M. Varghese	Secretary: Cihangir John Sen
Room: Regency B	Date: March 21 st , 2023	Time: 3:15 pm to 4:30 pm
Total TF Members: 25	Members present at the Quorum: 14	Attendance Per Roster: 62
Guests present: 41 (Table-2)	Membership requested: 20	Membership request accepted: 7
Status change to Guest: 7		Total TF Members: 25 (Table-1)

Chair's Remarks

The meeting was called to order at 3:16 PM on March 21, 2023. The Chair welcomed members and guests to the Spring 2023 meeting.

Attendance rosters were circulated. There were 62 participants present (including the Chair, Vice Chair, and the Secretary) and 20 participants requested voting membership. 7 of the 20 requests were granted according to their participation records. 7 members' statuses have changed to guest. Per the Working Group Policies and Procedures, voting membership status will be effective as of the start of the next meeting in Fall 2023. Table 1 is the final list of the 25 members of this WG. Table 2 lists the guests present at this meeting.

Table-1: Final Membership List (after S23 Meeting)

	First Name	Last Name		First Name	Last Name
1	Steve	Antosz	14	*Gabriel	Mamede
2	Gilles	Bargone	15	Jarrold	Prince
3	William	Boettger	16	*Leopoldo	Rodriguez
4	Juan	Castellanos	17	Dinesh	Sankarakurup
5	*Thomas	Dauzat	18	Cihangir John	Sen
6	Samraghi	Dutta Roy	19	*Pragnesh	Vyas
7	Bruce	Forsyth	20	Michael	Shannon
8	Saramma	Hoffman	21	Sam	Sharpless
9	*Ramadan	Issack	22	*Valeriu	Tatu
10	Sheldon	Kennedy	23	Ajith	Varghese
11	Gary	King	24	Jason	Varnell
12	Egon	Kirchenmayer	25	David	Wallach

13	*Fernando	Leal			

*New members

Chair made the call for the patent and shared the IEEE SA slides on patent policy and copyright. The attendees were asked if there were any Patents and Copyrights relevant to the scope that the TF should be aware of. None were reported.

Table-2: Guests present during S23 WG Meeting

	First Name	Last Name		First Name	Last Name
1	Alex	AlAhmed	22	Kent	Miller
2	Tauhid	Ansari	23	Francis	Mills
3	Jared	Bates	24	Michael	Pappas
4	Duvier	Bedoya	25	Dwight	Parkinson
5	Christopher	Borck	26	George	Partyka
6	Darren	Brown	27	Sanjay	Patel
7	Vivian	Chan	28	Monil	Patel
8	Nikolaus	Doillon	29	Sylvain	Plante
9	William	Elliott	30	Bertrand	Poulin
10	Richard	Frye	31	Ewald	Schweiger
11	Renjie	Fu	32	Salahuddin	Shaikh
12	Ravi	Gupta	33	Abdulmajid	Shaikh
13	Mike	Hall	34	Samuel	Tekle
14	John K	John	35	Jacob	Thielbar
15	Christopher	Johnson	36	Eduardo	Tolcachir
16	Akash	Joshi	37	Subash	Tuli
17	Stacey	Kessler	38	Cameron	Vant
18	Qasim	Khan	39	Nick	Vensen
19	Zan	Kiparizoski	40	Shelby	Walters
20	Robert	Mayer	41	Kris	Zibert
21	Kevin	Mazzei			

Quorum, Approval of Minutes and Agenda

At the time of quorum 14 of the 25 members were present so quorum was achieved short after the meeting start. The Unapproved minutes from the Fall 2022, meeting was already approved via email circulation. The agenda for Spring 2023 meeting was also unanimously approved.

TF started to discuss about the old businesses since quorum was achieved.

Steve Antosz mentioned that there is another task force (Chair-Hakan Sahin) that is also working on the cold resistance measurement issues and suggested both task force chairs to be aware of the parallel efforts in both TF's.

Old/ Unfinished Businesses:

#1 Replacing the word “Ultimate” with “Stabilized” in C57.12.90 clause 11.3.2

Sam Sharpless (Rimkus Consulting Group) made a motion to accept replacing the word “ultimate” with “stabilized”. David Wallach seconded. The proposed change has been unanimously approved as below.

Proposed Wording: Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ~~ultimate~~-stabilized liquid temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period

The change of replacing the word “Ultimate” with “Stabilized” in C57.12.90 clause 11.3.2 was approved.

#2 Adding a sentence to section 11.3.2 to clarify stabilized liquid temperature rise shall not be averaged

Sam Sharpless made a motion to approve adding the sentence as below. Samragni Dutta Roy seconded. No opposed to unanimous approval so the motion carried.

Proposed Wording: Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ~~ultimate~~-stabilized liquid temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period. *The stabilized liquid temperature rise determined at the end of the total loss run shall not be averaged over time.*

It was also approved to add a sentence to section 11.3.2 to clarify stabilized liquid temperature rise shall not be averaged.

#3 Hot spot rise calculation for OFAF /OFWF cooler transformer

Bertrand Poulin (Hitachi Energy) explained that there is a behavioral difference between OFAF transformers and ONAF transformers when it comes to evaluating the top oil. C57.119-2018 guide for overload tests shows typical profile, with differences in top oil temperature for OFAF and OFWF compared to ONAN and ONAF. Later in document shows calculations for difference, but in 12.90 there is no mention of the differences. Propose to ensure 12.90 makes this reference to difference between OFAF and others. It is suggested that the section should be a part of the test core (C57.12.90) rather than a guide (C57.119).

Ajith made a motion to add this section to C57.12.90. Bruce Forsyth (Bruce Forsyth and Assoc. PLLC) seconded, and the floor was opened for discussion.

Bertrand Poulin clarified that by adding this information into C57.12.90, we will achieve a better representation of OFAF and OFWF top oil temperatures.

David Wallach (Duke Energy) suggested to add the graph from C57.119 under C57.12.90 Clause 11.3 Temperature Measurements so that following subclauses can refer to that graphic.

Bruce Forsyth explained that the top oil rise in calculation of the hot spot rise may not reflect the top oil rise as the hottest

Sam Sharpless clarified that the C57.119 is owned by the Insulation Life Subcommittee so permission from the subcommittee and the copyright requirements will not be an issue if the TF decides using it in C57.12.90.

Motion was unanimously approved, and the TF agreed to identify volunteers to work on implementation of the graphic in C57.119 to C57.12.90. Below members volunteered to work on this task and will provide an initial report during the Fall 2023 meeting.

- Bertrand Poulin (Lead)
- Bruce Forsyth
- Jason Varnell
- Steve Antosz
- Ajith Varghese

#4 Negative Altitude Correction (Transformers tested at factories located > 1000 m)

Steve Antosz: Sub clause 11.4.3. Correction of liquid temperature rises for differences in altitude. This clause says to make an adjustment to oil rise when a transformer is tested at 1000 m or less and is to be operated at a higher altitude. But it does not say to make an adjustment when the opposite situation applies, such as when a transformer is tested above 1000 m and is to be operated at 1000 m or less. Currently some manufacturers are using their own formula to correct. I propose that we add verbiage to allow the reverse correction when such a situation applies.

Egon Kirchenmayer (Siemens Energy) provided one formula that can be applicable to + or – altitude delta correction.

Steve Antosz mentioned that the TF is close to finalize the review of the formula. Study Group will recirculate the formula and come up with a final proposal during the Fall 2023 meeting.

#5 Tap Selection for Temp Rise Test:

Steve Antosz: Sub clauses 11.1.2.1 and 11.1.2.2 say, "Transformer shall be tested with the combination of connections and taps that give the highest average winding temperature rise." This may be good for two-winding transformers, but (for example) for an autotransformer with a loaded tertiary, there may be cases of allowable loading that produce higher total losses (and rises), such as arithmetic or Vectorial step-up and step-down loading cases, if specified.

a) Stipulate the measurement (determination) of maximum total losses for three-winding transformers which is dependent on the combination of connection, taps, and loading case. These losses would have to injected or adjusted for using corrections in sub clause 11.4.2.

b) For an autotransformer the maximum common winding current should be circulated (or adjusted) for the measured winding temperature gradient and winding rises to be determined. If the maximum current cannot be circulated, the results should be adjusted using corrections in sub clause 11.4.1

c) Temperature rise test tap selection. Once total losses are determined, the selection of a tap position for temperature rise test should allow the current to flow in as many as possible turns and windings to avoid any possible thermal issues in untested turns and cables. In some cases, this might apply to involve series and PA transformers, if provided

TF Discussion/Decision: Hakan Sahin, Steve Antosz, Jason Varnell, Dinesh Sankarakurup, Cihangir Sen and Ajith Varghese met on March 3rd to discuss the section on a virtual meeting and had several email communications. Steve Antosz summarized that the Subgroup is not close to finalize the task and asked for more volunteers. The Chair specifically asked for help with the transformers with separate regulating windings, series and preventative auto-transformers, transformers with loaded tertiaries.

#6 Ambient measurement location

Ajith Varghese (GE-Waukesha): Standard allows ambient measured between 1 to 2 meters away from transformer. That is large tolerance allowed which can affect rises by 0.25 to 0.5 C. Suggest standardizing to 1 Meter, which seems to be most common practice. In general user prefer 2 meters but it is more advantageous for the manufactures to measure at 1 meter. Ajith made a motion to change the requirement as 1 meter. Juan Castellanos (GE-Prolec) seconded, and the subject opened for discussion. Akash Joshi (Mott MacDonald) commented that the current requirement is more reasonable and already giving the option to the manufacturers to measure at 1m. Limiting at 1m might cause extra work for the manufacturer to justify the 1m with a tape measure each time during testing. TF agreed to keep the requirement as is. Ajith withdrew the motions. No change in the requirement.

#7 Standardize Method for Hot resistance extrapolation

Ajith Varghese: Different manufacturers use different methods to extrapolate. IEEE does not have a formula or method specified. Depending on different methods, temperature can vary by 1-3 degree. TF will continue to work on the topic about standardizing the method for hot resistance extrapolation. Volunteers will work on different manufacturers' methodologies. TF will also review a presentation by Bertrand Poulin that shows the numerical equivalent of old IEC's graphical method during the next meeting. Bertrand will share the presentation with the TF Chair to be reviewed during Fall 2023 Meeting.

Meeting was adjourned at 4:32pm.

Minutes respectfully submitted by

Cihangir John Sen
Secretary

Dinesh Sankarakurup made a motion to approve the TF's recommendation for C57.12.90 Clause 11.3.2 as, "Liquid temperature rise is the difference between liquid temperature and ambient temperature. The stabilized liquid temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1°C, whichever is greater during a 3 h period." Ajith Varghese seconded the motion. There was no opposition to the motion. It passed by unanimous consent.

H.4 Technical Activity Reports:

H.4.1 WG IEEE 1276a IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid Immersed Distribution, Power and Regulating Transformers, Amend Annex B – Kevin Biggie WG Chair presented meeting minutes

WG IEEE 1276a, Amend Annexes B&D – Meeting Minutes
IEEE 1276 - IEEE Guide for the Application of High-Temperature Insulation Materials in Liquid-Immersed Distribution, Power, and Regulating Transformers
Monday, 20 March 2023, 1:45pm – 3:00pm (CDT) – Spring 2023 Meeting, Milwaukee, WI, USA

- Chairman: Kevin Biggie (Weidmann)
- Vice-chair: George Frimpong (Hitachi Energy)
- Secretary: Evanne Wang (DuPont)

The Chair called the meeting to order at 1:45pm and welcomed attendees. A total of fifty-four (54) attendees were present with nineteen (19) members present including the Chair, Vice-Chair, and Secretary. A quorum was achieved. Eight (8) guests requested membership and five (5) guests met the requirement of attending two of the last three meetings and thus the WG welcomes new members: Roberto Da Silva (Ignacio), Jeffrey Door, Luis Gonzalez, Attila Gyore, and Emilio Morales-Cruz. Unfortunately, we were informed that a WG Member had passed away recently. Given these changes, the new total number of members is thirty (30).

The Chair introduced the WG and that this is work to amend to the two annexes (B & D) from IEEE 1276. The meeting agenda, essential patent claims information, and copyright information were reviewed. No patent claims were noted. The minutes from the last meeting on October 17th, 2022 were reviewed and unanimously approved as a motion by Lance Lewand (Doble) and seconded by Alan Sbravati (Hitachi Energy). The Chair presented the proposed agenda for this meeting, which was unanimously approved as a motion by Sam Sharpless (Rimkus Consulting) and seconded by Stephen Oakes (WEG Transformers). Both the unapproved minutes from the last meeting and the proposed agenda were sent prior to the in-person meeting to the members and guests of this WG.

The Chair proceeded to follow the presented agenda. Comments received for each slide by title are noted below:

Scope: Task Force decisions

- If TC claims allowed, what is the “threshold” for a TC claim:
 - Option 1: No threshold, any TC claim can be included, from any test
 - **Option 2: Threshold = must be tested and evaluated per C57.100 (any version)**
 - In a peer reviewed published technical paper only (“peer reviewed” defined as a document that can be found in e.g. IEEE Xplore or CIGRE)
 - Option 3: Threshold = must be tested per C57.100-2011 version or newer (only)



- The Chair reviewed that the Task Force established at the last WG meeting to draft the amendment (called “TF Draft Amendment”) had met twice since the last WG meeting. In the meetings, the TF decided on the remaining aspects of the scope of the amendment, which were not decided by the WG at the last meeting. However, before proceeding, the Chair reviewed these TF decisions to seek approval of the full WG.
- Regarding the scope question about the threshold for making a thermal class claim in the Annex, the Chair asked the WG if there were any questions or comments about confirming the TF decision of “Option 2,” originally stated as: “The threshold for a TC claim is that it must be tested per IEEE C57.100 (any version) in a peer reviewed published technical paper (peer reviewed defined as a document that can be found in e.g. IEEE Xplore or CIGRE).”
 - Alan Sbravati (Hitachi Energy) mentioned that when testing is conducted according to IEEE C57.100, this can be broken into two steps: the first is how the test was performed and the second is how the data was analyzed. The Chair clarified that selection of “Option 2” means that both testing and analysis were conducted to IEEE C57.100.
 - The Chair proceeds to question if the phrase “must be tested (aged and analyzed) according to C57.100” should be added.
 - Stu Chambers (Powertech Labs) notes that the user should indicate which version of IEEE C57.100 was used.
 - The Chair re-stated “Option 2” that in addition to having the data in a peer reviewed technical published paper, that the threshold to include a TC claim is that the testing and evaluation must be evaluated per the same version of IEEE C57.100, in which the version used must be listed.
 - Alan Sbravati (Hitachi Energy) noted that he does not agree that the testing and the evaluation should be conducted to the same version of IEEE C57.100, and proposes to keep the wording as written.
 - Stu Chambers (Powertech Labs) responds that most published papers do not take existing older data and re-evaluate it with a newer method.
 - Lance Lewand (Doble) agrees with Stu Chambers (Powertech Labs) in that testing and evaluation should be conducted to the same version.

- Alan Sbravati (Hitachi Energy) responded that in the testing, there are several pieces of collected data. This data can still be evaluated based on different kinds of methods.
- Stu noted that the same method needs to be used for both testing & evaluation.
- Stephen Oakes (WEG Transformers) noted that in the future, the 2022 version of IEEE C57.100 will be used. The data submitted should be kept as valid references, so “option 2” should be amended with “evaluated per the most current version of IEEE C57.100”.
- Jinesh Malde (M&I Materials) made a **motion to vote that part of the scope of the WG will be a restated Option 2: “The threshold for a TC claim is that it must be tested and evaluated per IEEE C57.100 (any version) in a peer reviewed published technical paper (peer reviewed defined as a document that can be found in e.g. IEEE Xplore or CIGRE).” Mike Shannon (REA Magnet Wire) seconded the motion. The WG voted as follows:**
 - Yes: 16
 - No: 0
 - Abstain: 2

This motion passed.

Scope: Task Force decisions

- In cases of conflicting (different) TC claims for same insulation system:
 - Option 1: Don’t include either claim
 - Option 2: List claim from tests performed to C57.100-2011 version or newer (only)
 - Option 3: List both claims, and leave decision to reader
 - **Option 3 (reworded): all claims will be listed along with a descriptive paragraph defining the differences, and for the TF to make a recommendation on the claim (back to the WG)**



- Regarding the scope question about how to deal with aging examples that offer conflicting thermal class claims for the same insulation system, the Chair asked the WG if were any questions or comments about confirming the TF decision of “Option 3 (reworded),” originally stated as: “All claims will be listed along with a descriptive paragraph defining the differences, and for the TF to make a recommendation on the claim (back to the WG, or even Subcommittee if needed).”
 - Lance Lewand (Doble) asked if this option only refers to examples that are going to be in the amendment. The Chair clarified that this option refers to examples that have TC

claims that were tested by the same standard in a peer reviewed published technical paper, per the previous slide.

- Sam Sharpless (Rimkus Consulting) commented that it is not appropriate to have the Insulation Life Subcommittee (ILSC) make decisions based on the findings of this TF, and rather the WG should handle any comments.
 - **The Chair entertained a motion to approve removing the Subcommittee reference wording, and that part of the scope of the WG will be a restated Option 3: “All claims will be listed along with a descriptive paragraph defining the differences, and for the TF to make a recommendation on the claim (back to the WG)”.**
 - **Alan Sbravati (Hitachi Energy) made this motion with Jinesh Malde (M&I Materials) seconding. The Chair asked if there were any objections to a unanimous approval. The Chair received no objections and unanimous approval was granted.**

The Chair continued to review other progress that the TF made.

- Sam Sharpless (Rimkus Consulting) asked if there is a deadline for submission of data or information, and that if not, one should be established. The Chair clarified that no formal deadline has been established. Sam noted that he would make a motion that the WG does not accept new data after the end of 2023, and that any new data can be included in a future revision. He noted that it is important that documents are not kept open for long periods. Stu Chambers (Powertech Labs) agreed and seconded this motion.
 - **The Chair then called a vote on the motion: “The deadline for submission of data from peer-reviewed technical papers is that they must be published prior to December 31st, 2023.” The WG voted as follows:**
 - **Yes: 15**
 - **No: 2**
 - **Abstain: 1**

This motion passed.

The Chair noted that the WG meeting is out of time, and that the next TF meeting will be held virtually on June 14th, 2023 at 11am EST with any volunteers welcome to attend. ***Secretary's Note: subsequent to the meeting, the next TF Draft Amendment meeting was moved to June 7th, 2023 at 11am EST.

A motion for meeting adjournment was made by Lance Lewand (Doble) and seconded by Jinesh Malde (M&I Materials). The meeting was adjourned at 3:00pm.

Respectfully submitted,

Kevin Biggie, Chair
George Frimpong, Vice-Chair
Evanne Wang, Secretary

Attendance WG IEEE 1276a Annex B & D Meeting (03/20/2023):

- Attendees: 54
- Members present: 19
- Guests requesting membership: 8
- Guests granted membership: 5

The following attendees were present:

Last/Family/Surname	First/Given Name	Affiliation / Company Name	Status / Role
Almeida	Nabi	Prolec GE	Member
Baumann	Brian	Cargill, Inc.	Guest

Beaster	Barry		Guest
Biggie	Kevin	Weidmann Electrical Technology	Chair
Bradshaw	Jeremiah	Bureau of Reclamation	Guest
Casserly	Edward	Ergon	Guest
Castellanos	Juan	Prolec GE	Member
Chambers	Stuart	Powertech Labs	Member
Coker	Anthony	M&I Materials	Member
Cordova	Olivia	Bureau of Reclamation	Guest
Da Silva (Ignacio)	Roberto	Cargill	Member
Dolloff	Paul	East Kentucky Power	Guest
Door	Jeffrey	The H-J Family of Companies	Member
Espindola	Marco	Hitachi Energy	Guest
Ferdjallah	Esseddih	Siemens Energy	Guest
Forsyth	Bruce	Bruce Forsyth & Associates PLLC	Guest
Frazier	Raymond	Ameren	Guest
Frimpong	George	Hitachi Energy	Vice-Chair
Ghosh	Rob	GE	Guest
Gonzalez	Luis	Conduct Industries	Member
Gyore	Attila	M&I Materials	Member
Johnson	Christopher	Oncor	Guest
Kaineder	Kurt	Siemens Energy	Member
Kennedy	Sheldon	Niagara Transformer	Guest
Kessler	Stacey	Ulteig Engineering	Guest
Kulasek	Krzysztof	Delta Star Inc.	Guest
La Bean Jr.	Bernard	Consumers Energy	Guest
Lewand	Lance	Doble	Member
Li	Chao	Eaton	Member
Lucas	Tiffany	Prolec GE Waukesha	Member
Malde	Jinesh	M&I Materials	Member
Marshall	Paul	Ameren	Guest
McBride	Brian	Cargill	Member
Morales-Cruz	Emilio	Qualitrol	Member
Oakes	Stephen	WEG Transformers	Member
O'Malley	Anastasia	Consolidated Edison	Guest
Pappas	Michael	Roechling	Guest
Plecevic	Uros	Invenergy	Guest
Reiss	Tony	Custom Materials Inc.	Member
Saad	Mickel	Hitachi Energy	Guest
Sbravati	Alan	Hitachi Energy	Member
Shalabi	Jaber	VanTran Transformer	Guest
Shannon	Michael	REA Magnet Wire	Member
Sharpless	Samuel	Rimkus Consulting	Member
Steineman	Chris	Delta Star Inc.	Guest
Tekle	Samuel	WEG Transformers USA	Guest
Tillery	Tim	Howard Industries	Guest
Traut	Alan	Howard Industries	Guest
Trifunowski	Risto	Trench Group	Guest
Walder	Nick	Eaton Corp	Guest

Wang	Evanne	DuPont	Secretary
Weiss	Zachery	WEG Transformers	Member
Whitehead	William	H2Scan Corp	Guest
Wirtz	Kevin	Cargill, Inc.	Guest

H.4.2 WG PC57.91 Guide for Loading Mineral-Oil-Immersed Transformers –
David Wallach WG Chair presented meeting minutes

IEEE PES Transformer Committee
Working Group PC57.91 Loading Guide
Spring 2023 Meeting Minutes

March 20, 2023, 11:00-12:15 PM (CST)

Hotel Hyatt Regency, Milwaukee, WI

1. Call to Order
2. The Chair presented the meeting agenda.
3. Chair reiterated the following IEEE-SA Policies:
 - A. Call for Essential Patents
 - B. Copyright
 - C. Antitrust
 - D. Code of Ethics
4. Establishment of quorum: Members in Attendance-26; Total Members-51; Total Attendees-126. Quorum was established at 51% after a recount.
5. The chair asked for a unanimous approval of this meeting's agenda (after establishing quorum), and it was so approved, with no objections. Weijun Li proposed a motion to approve the agenda and Eduardo Garcia seconded it, with none opposing it.
6. Javier Artega informed the Chair that he is stepping down as the Vice Chair.
7. The chair asked for a motion for approval of the Oct 18, 2022, Charlotte WG Meeting minutes (after establishing quorum). John John moved the motion to approve the minutes and Eduardo Garcia seconded with none opposing it.
8. The Chair provide a status update for the guide:
 - A. Draft 6 has been posted on the TC website.
 - B. We have revised almost 2/3 portion of the old revision.
 - C. Draft 6 after revisions will be sent out as Draft 7 to this working group as a straw ballot.
 - D. After making revisions. if any. we plan to send draft 7 out as Draft 8 to the subcommittee, followed by the MEC process and finally to SA Ballot hopefully in October 2023.
 - E. Request will be made for PAR extension until Dec 31, 2024.

- F. No update on suggestions for changing the verbiage of the purpose section and revisions to Table 3 has been received until this meeting from Peter Z/ Jeffery W/ Amitabh S / Curtis F / Michael S.

9. Other Discussions:

- A. Alex Levin - Reference to IEEE 1276 should be removed since other cooling fluids are excluded in that standard.
- B. Sam Sharpless- There is some degree of risk involved with overloading a transformer. Suggest replacing the word risk with "understanding that operating beyond name plate capacity reduces the life of the transformer".
- C. Jeff Wright- We should not say overloading in the purpose but instead beyond name plate capacity of the transformer.
- D. The Chair noted (filling in for Oleg Roizman since he could not attend) that Clause 5 has been refreshed.
- E. The Chair asked the members if they had any comments on Draft 5 that had been posted on the TC website. John John who reviewed the Draft5 said he had none. The Chair explained the main changes in Draft 5 as under:
 - a. General cleanup was done.
 - b. The Chair went over the revisions to Clause 5.
 - c. Clause 10 is brand new. Paul D remarked that Section 10.5 was followed by one utility.
 - d. Appendixes and bibliography are mostly the same as before.
 - e. We plan to send Draft 6 after editing as a straw ballot to the working group. The Chair requested a Comment Resolution Team (CRT) Volunteers- Saramma Hoffman, Zach Draper and Kayland Adams volunteered to be part of this Team.
 - f. The Chair asked a motion to approve the formation of the CRT. Stuart Chalmers proposed a motion to approve the motion and Eduardo Garcia seconded it, with none opposing it.
 - g. The Chair asked a motion to authorize the CRT Team to make necessary revisions based upon comments received via straw ballot. Jonathan Sinclair proposed a motion to approve the motion and Weijun Li seconded it, with none opposing it.
 - h. Barry Beaster asked if the open-source code (OSC) can now be downloaded from the IEEE repository and the Chair confirmed that.
 - i. Juan Carlos asked if the OSC has been validated. The Chair confirmed that the OSC has been validated by Egon K with a few exceptions, the PowerPoint for which is available on the TC-C57.91 working group website for viewing.
 - j. The Chair remarked that Annex G with differential equations has now been included in Clause 7.
 - k. The Chair informed the working group that the OSC is informative and not normative.
 - l. Zack Draper mentioned that the model assumptions are the same as before, but without the assumptions in Clause 7.

- m. Mickel Saad asked how the end user will know if the OSC in the IEEE repository has the latest revision code. Zack replied that the repository will have revision remarks and will track any changes made.
10. There was no new business.
11. Next Meeting: The chair announced that the next meeting is scheduled to be held on Oct 23, 2023, at Kansas City, MO.
12. Adjournment

Chair: David Wallach

Vice-Chair: Javier Arteaga

Secretary: Kumar Mani

Attendee List:

First Name	Last Name	Role	Company	Requested Membership
Kayland	Adams	Guest	GE Prolec	Y
Carlos	Alonso Martinez	Guest	Arteche	
Mihir	Amin	Guest	Eaton Corporation	
Elise	Arnold	Guest	SGB	
Robert	Arrity	Guest	EPRI	
Gilles	Bargone	Member	FISO Technologies Inc.	
Jared	Bates	Guest	Oncor Electric Delivery	Y
Jean Noah	Berube	Guest	Rugged Monitoring	
Barry	Beaster	Guest	H-J Entepries	
Daniel	Blaydon	Member	Baltimore Gas & Electric	
Piotr	Blaszczyk	Guest	Specialty Transformer Corp	
William	Boettger	Guest	Boettger Transformer Consulting LLC	
Sanket	Bolar	Guest	Oncor	
Jeremiah	Bradshaw	Guest	Bureau of Reclamation	
Elizabeth	Bray	Guest	Southern Co	
David	Calitz	Member	Siemens Energy	
Camilo	Casallas	Guest	Trench Group	Y
Ed	Casserly	Guest	Ergon	
Juan	Castellanos	Member	Prolec GE	
Fidel	Castro	Guest	SDE&G	Y
Arup	Chakraborty	Guest	Delta Star	Y
Stuart	Chambers	Guest	Powertech Labs	
Juan Carlos	Cruz Valdes	Guest	Prolec GE	Y
Stuart	Chambers	Member	Powertech Labs Inc.	
Anthony	Coker	Guest	M&I Materials	
Michael	Craven	Guest	Qualus Power Services	

Annex H

Roberto	DaSilva	Guest	Cargil	Y
Samson	Debass	Guest	EPRI	Y
Yasin	Demir	Guest	GE Grid Solutions / Prolec	
Scott	Digby	Guest	Duke Energy	
Paul	Dolloff	Member	East Kentucky Power	
Zachary	Draper	Member	Delta-X Research Inc.	
Hakim	Dulac	Guest	Advanced Power Technologies	Y
William	Elliot	Guest	AEP-SWEDCO	
Qusai	Elnimri	Guest	Vanguard Industries	
Marco	Espindola	Guest	Hitachi Energy	Y
Raymond	Frazier	Member	Ameren	
George	Frimpong	Member	Hitachi Energy	
Renjie	Fu	Guest	ERMCO / VDF Transformers	
James	Gardner	Guest	Prolec Ge Waukesha	
Eduardo	Garcia Wild	Member	Siemens Energy	
Miguel	Garcia	Guest	Hitachi Energy	Y
Alireza	Gorzin	Guest	Black & Veatch	
Luis	Gonzalez	Guest	Conduct Industries Ltd	
Corey	Hanson	Guest	Advanced Power Technologies	Y
Gioyanni	Hernandez	Guest	Hernandex BJ	Y
Jean Carlos	Hernandez-Mejia	Guest	GT-NEETRAC	Y
Saramma	Hoffman	Member	PPL Electric Utilities	
Ryan	Hogg	Guest	Bureau of Reclamation	
Saif	Hossain	Guest	Trench Canada	
Nick	Jensen	Guest	PG&E	
John	John	Member	Virginia Transformer Corp	
Christopher	Johnson	Guest	Oncor	
Kurt	Kaineder	Guest	Siemens Energy	
Jerzy	Kazmierom	Guest	Hitachi Energy	Y
Anton	Koshel	Guest	Delta Star Co	
Rafal	Kowalski	Guest	Hitachi Energy	
Stacey	Kessler	Member	Ulteig	
Gary	King	Guest	Howard Industries	
Zan	Kiparizoski	Guest	Howard Industries	
Dimitry	Klempner	Guest	SCE	Y
Egon	Kirchenmayer	Member	Siemens Energy	
Christoph	Kerschenbauer	Guest	Siemens Energy	
Anton	Koshel	Guest	Delta Star Inc.	
Jason	Lambert	Guest	JST Power Equip	
Aleksandr	Levin	Member	Weidmann Electrical Technology	
Weijun	Li	Member	Braintree Electric Light Dept.	
Jose Luis	Machain	Guest	GE Prolec	Y
Kushal	Mahajan	Guest	Eaton Corp.	

Annex H

Kumar	Mani	Secretary	Duke Energy	
Kevin	Mazzei	Guest	Black & Veatch	Y
Jinesh	Malde	Guest	M&I Materials Inc	
Darrell	Manubhat	Member	Siemens Energy	
Lee	Matthews	Member	Howard Industries	
Omar	Mendez	Guest	Prolec	
Juliano	Montanha	Guest	Siemens Energy	
Yuri	M Rellini	Guest	Siemens Energy	
Hugo	Murillo	Guest	H-J Family of Companies	
Paul	Mushill	Member	Ameren	
Annatasia	O'Malley	Guest	ConEd of NY	
Michael	Pappas	Guest	Roeschling Industries	
Monik	Patel	Guest	PG&E	Y
Sanjay	Patel	Guest	Royal SMIT Transformers	
Migrel	Plascencia	Guest	PG&E	
Homar	Portillo	Member	Advanced Power Tech	
Guran	Plisic	Guest	Siemens Energy-KPT	
Igor	Persirec	Guest	Siemens Energy-KPT	
Damiam	Podgorski	Guest	Sargent & Lundy	
Ulf	Radbrandt	Guest	Hitachi Energy	
Michael	Richardson	Guest	Ameren	
Rodrigo	Ronchi	Guest	WEG Transformers	
Tim	Rocque	Guest	GE Prolec Waukesha	
Mickel	Saad	Member	Hitachi Energy	
Amitabh	Sarkar	Member	Virginia Transformer Corp.	
Markus	Schiessl	Guest	SGB	
Ewald	Schneider	Guest	Siemens Energy	
Stephan	Schindler	Guest	MR-Germany	
Alfons	Schrammel	Guest	Siemens Energy	
Jabar	Shalabi	Guest	Vantran Industries	
Mike	Sharp	Guest	Trench Canada	
Samuel	Sharpless	Member	Rimkus Consulting Group	
Hemant	Shertukde	Guest	Hartford University	Y
Ibrahim	Shteyh	Guest	Schneider Electric	Y
Rich	Simonelli	Guest	GE Grid / Prolec	
Jonathan	Sinclair	Guest	PPL Electric Utilities	
Sanjib	Som	Guest	Pennsylvania Transformer	Y
Mike	Spurlock	Guest	Spurlock Engineering Services	
Brad	Staley	Member	Leeward Renewable Energy	
Lina	Stadsten	Guest	Hitachi Energy	
Tim	Tillery	Guest	Howard Industries	
Eric	Torongo Blanco	Guest	Olsun Electric	

Mark	Tostrud	Member	Dynamic Ratings Inc	
Core	Van Droos	Guest	American Transmission Company	Y
Gos	Veens	Guest	SMIT	
Kannan	Veeran	Guest	Virginia Transformers	
Richard	vonGemmingen	Member	Dominion Energy	
Mike	Waldrop	Guest	MLETW	
Nick	Walder	Guest	Eaton Corp	
David	Wallach	Chair	Duke Energy	
Evanne	Wang	Guest	DuPont	
Shelby	Walters	Guest	Howard Industries	
Matthew	Webb	Guest	GE Prolec Waukesha	
Joe	White	Guest	Power Engineers	
Zach	Weiss	Guest	WEG Transformers	
Trent	Williams	Gest	Advanced Power Technologies	
Jeffrey	Wright	Member	Duquesne Light Co.	
Fei	Yang	Member	Hitachi Energy	
Guang	Yuan	Guest	Hitachi Energy	Y
Kwasi	Yeboah	Guest	GE Grid	Y
Anand	Zanwal	Guest	Siemens Energy	
Ker	Zibert	Guest	Allscier Martin	

H.4.3 PC57.162 Guide for the Interpretation of Moisture Related Parameters in Liquid Immersed Transformers and Reactors – Tom Prevost WG Chair presented meeting minutes

Chair: Tom Prevost
Secretary: Deanna Woods

No meeting was held in Milwaukee as the document is in ballot. The ballot resolution committee met and reviewed the comments. One hundred and eight participants balloted with an 88% return with over 75% approval rate. The committee is going through 808 comments. The next recirculation of the ballot is targeted for June. The final document must be submitted to REVCON by October 16th. The PAR expires on December 31, 2023.

H.4.4 PC57.165 IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors – Mark Tostrud WG Chair presented meeting minutes

Chair: Mark Tostrud
Vice Chair/Secretary: Zan Kiparizoski

No working group meeting was held in Milwaukee as the guide is in the balloting process. The ballot closed on March 2 and the group will work to resolve the ballot comments before the PAR expires on December 31, 2023.

H.5 Old Business

None.

H.6 New Business

C57.119 IEEE Recommended Practice for Performing Temperature Rise Tests on Liquid-Immersed Power Transformers at Loads Beyond Nameplate Rating was last revised in 2018 and expires in 2028. Need to determine if a revision is necessary.

Drew Welton made a motion to form a study group for the possible revision of C57.119. Marcos Ferreira seconded the motion. There was no opposition to the motion. It passed by unanimous consent.

Anyone interested in participating in this study group should email Sam Sharpless.

Attendance:

80 Members

106 Guests

Chair	Sharpless	Samuel	Rimkus Consulting Group
Vice-Chair	Malde	Jinesh	M&I Materials Inc.
Member	Almeida	Nabi	Prolec GE
Member	Antosz	Stephen	Stephen Antosz & Associates, Inc
Member	Arteaga	Javier	Hitachi Energy
Member	Ayers	Donald	Ayers Transformer Consulting
Member	Bargone	Gilles	FISO Technologies Inc.
Member	Beaster	Barry	H-J Family of Companies
Member	Biggie	Kevin	Weidmann Electrical Technology
Member	Blaszczyk	Piotr	STC
Member	Boettger	William	Boettger Transformer Consulting LLC
Member	Botti	Michael	Hyosung HICO
Member	Calitz	David	Siemens Energy
Member	Cassery	Edward	Ergon
Member	Castellanos	Juan	Prolec GE
Member	Chakraborty	Arup	Delta Star Inc.
Member	Chambers	Stuart	Powertech Labs Inc.
Member	Chiang	Solomon	The Gund Company
Member	Denzer (Mabrey)	Stephanie	Weidmann Electrical Technology

Member	Digby	Scott	Duke Energy
Member	Dulac	Hakim	Advanced Power Technologies
Member	Dutta Roy	Samragini	Siemens Energy
Member	Ferreira	Marcos	Bridge View Resources
Member	Forsyth	Bruce	Bruce Forsyth and Associates PLLC
Member	Frimpong	George	Hitachi Energy
Member	Frotscher	Rainer	Maschinenfabrik Reinhausen
Member	Garcia Wild	Eduardo	Siemens Energy
Member	Gaytan	Carlos	Prolec GE
Member	Griesacker	Bill	Duquesne Light Co.
Member	Gyore	Attila	M&I Materials Inc.
Member	Hayes	Roger	GE
Member	Hoffman	Saramma	PPL Electric Utilities
Member	Holden	Andrew	Ergon
Member	Issack	Ramadan	American Electric Power
Member	John	John	Virginia Transformer Corp.
Member	Joshi	Akash	Mott MacDonald
Member	Kazmierczak	Jerzy	Hitachi Energy
Member	Kennedy	Sheldon	Niagara Transformer
Member	King	Gary	Howard Industries
Member	Kiparizoski	Zan	Howard Industries
Member	Kirchenmayer	Egon	Siemens Energy
Member	Lee	Moonhee	Hammond Power Solutions
Member	Levin	Aleksandr	Weidmann Electrical Technology
Member	Li	Weijun	Braintree Electric Light Dept.
Member	Mani	Kumar	Duke Energy
Member	McBride	Brian	Cargill, Inc.
Member	Miller	Kent	T&R Electric Supply Co.
Member	Murray	David	Tennessee Valley Authority
Secretary	O'Malley	Anastasia	Consolidated Edison Co. of NY
Member	Panesar	Parminder	VA Transformer
Member	Patel	Poorvi	Electric Power Research Institute (EPRI)
Member	Parkinson	Dwight	EATON Corporation
Member	Pointner	Klaus	Trench Austria GMBH
Member	Posadas	Daniel	Prolec GE
Member	Prevost	Thomas	Weidmann Electrical Technology
Member	Prince	Jarrod	ERMCO
Member	Reed	Scott	MVA
Member	Saad	Mickel	Hitachi Energy
Member	Sahin	Hakan	Virginia/Georgia Transformer
Member	Sankarakurup	Dinesh	Duke Energy
Member	Sarkar	Amitabh	Virginia Transformer Corp.

Member	Sbravati	Alan	Hitachi Energy
Member	Schweiger	Ewald	Siemens Energy
Member	Skinger	Kenneth	Scituate Consulting, Inc.
Member	Som	Sanjib	Pennsylvania Transformer
Member	Szczechowski	Janusz	Maschinenfabrik Reinhausen
Member	Tanaka	Troy	Burns & McDonnell
Member	Tostrud	Mark	Dynamic Ratings, Inc.
Member	Traut	Alan	Howard Industries
Member	Varghese	Ajith	Prolec GE
Member	Varnell	Jason	Doble Engineering
Member	Vir	Dharam	Prolec GE
Member	Vyas	Pragnesh	Sunbelt-Solomon
Member	Waldrop	Hugh	Memphis Light, Gas & Water
Member	Wallach	David	Duke Energy
Member	Wang	Evanne	DuPont
Member	Weiss	Zachery	WEG Transformers USA Inc.
Member	Welton	Drew	Intellirent
Member	Whitehead	William	H2scan Corporation
Member	Ziomek	Waldemar	PTI Transformers
Guest	Acosta	Juan	Ergon
Guest	Adams	Kayland	Prolec GE Waukesha
Guest	Anderson	Gregory	GW Anderson & Associates, Inc.
Guest	Ansari	Tauhid	Hitachi Energy
Guest	Baumgartner	Christopher	WE Energies
Guest	Berube	Jean-Noel	Rugged Monitoring
Guest	Betancourt	Edwin	Siemens Energy
Guest	Bhatt	Vivek	Prolec GE Waukesha
Guest	Bolliger	Dominique	HV Technologies
Guest	Bonn	Mike	Soltex
Guest	Bradshaw	Jeremiah	Bureau of Reclamation
Guest	Brown	Darren	Howard Industries
		Juan	
Guest	Carrizales	Alfredo	Prolec GE
Guest	Casallas	Camilo	Trench Limited
Guest	Cho	EanYoung	Hico America
Guest	Coker	Anthony	M&I Materials Inc.
Guest	Colopy	Craig	retired
Guest	DaSilva	Roberto	Cargill, Inc.
Guest	Debass	Samson	EPRI
Guest	Dillon	Nikolaus	Dominion Energy
Guest	Door	Jeffrey	the H-J family of companies
Guest	Duffy	Jesse	Nashville Electric Service
Guest	Draper	Zachary	Delta-X Research

Guest	Elimiri	Qusai	Vantran Industries
Guest	Ermakov	Evgenii	Hitachi Energy
Guest	Espindola	Marco	Hitachi Energy
Guest	Fong	Sanford	Georgia Power
Guest	Gardner	James	Prolec GE Waukesha
Guest	Ghosh	Rob	GE
Guest	Gonzalez	Luis	Canduct Industries
Guest	Gorzin	Alireza	Black & Veatch
Guest	Grooms	Brad	Native Transformer Services
Guest	Gupta	Ravi	Megger
Guest	Heiden	Kyle	EATON Corporation
	Hernandez		
Guest	Cano	Sergio	Hammond Power Solutions
	Hernandez-		
Guest	Mira	Jean Carlos	GT Neetrac
Guest	Hossain	Saif	Trench Limited
Guest	Jensen	Nick	Delta Star Inc.
Guest	Johnson	Christopher	Oncor
Guest	Kerschenbauer	Christoph	Siemens Energy
Guest	Khan	Qasim	Neetrac - Georgia Tech
Guest	LaBean	Bernard	Consumers Energy
Guest	Lachance	Mathieu	Omicron
Guest	Larison	Andrew	Hitachi Energy
Guest	Li	Chao	EATON Corporation
Guest	Lucas, P.E.	Tiffany	Prolec GE
Guest	Macias	Alejandro	Center Point Energy
Guest	Mayer	Robert	Siemens Energy
Guest	Mazzei	Kevin	Black & Veatch
Guest	Mellin	Toni	Vaisala
Guest	Mendez	Omar	Prolec
Guest	Mills	Francis	Power Engineers
Guest	Minikel	Justin	EATON Corporation
Guest	Montanha	Juliano	Siemens Energy
Guest	Montpool	Rhea	Schneider Electric
Guest	Morales-Cruz	Emilio	Qualitrol Company LLC
Guest	Murillo	Hugo	The HJ family
Guest	Mushill	Paul	Amerin
Guest	Naja	Ismael	EATON Corporation
Guest	Newbill	Mark	Hitachi Energy Alamo
Guest	Niroula	Ashmita	Ergon
Guest	Pappas	Michael	Roehling Industries
Guest	Patel	Monil	PG&E
guest	Patel	Rakesh	Hitachi Energy
Guest	Patel	Sanjay	SGB-SMIT

Guest	Pellon	Verena	Next Era
Guest	Pepe	Harry	Phenix Technologies, Inc.
Guest	Plascencia	Miguel	PG&E
Guest	Radu	Ion	Hitachi Energy
Guest	Reepe	Roberts	Georgia Power
Guest	Richardson	Michael	Ameren
Guest	Rocque	Tim	Prolec GE Waukesha
Guest	Ronchi	Rodrigo	WEG Transformers USA Inc.
Guest	Rossini	Yuri	Siemens Energy
Guest	Rutledge	Chris	Dynamic Ratings, Inc.
Guest	Sawant	Anil	Virginia Transformer Corp.
Guest	Sen	Cihangir	Duke Energy
Guest	Shaikh	Salahaddin	Hitachi Energy
Guest	Shalabi	Jaber	Vantran
Guest	Sharp	Michael	Trench Limited
Guest	Simons	Andre	JFE Shoji Power Canada Inc.
Guest	Slattery	Chris	First Energy
Guest	Snyder	Jason	First Energy
Guest	Soto	Mauricio	Hitachi Energy
Guest	Sparling	Brian	Dynamic Ratings, Inc.
Guest	Spurlock	Mike	Spurlock Engineering Services, LLC
Guest	Stacy	Fabian	Hitachi Energy
Guest	Stankes	David	3M
Guest	Stechschulte	Kyle	American Electric Power
Guest	Sweetser	Charles	OMICRON electronics Corp USA
Guest	Syed	Ali	ComEd
Guest	Sze	Matthew	Omicron Electronics
Guest	Tarango	Erik	Olsun Electrics
Guest	Taylor	Marc	JFE Shoji Power Canada Inc.
Guest	Thomas	Scott	Hitachi Energy
Guest	Tillery	Tim	Howard Industries
Guest	vonGemmingen	Richard	Dominion Energy
Guest	Washburn	Alan	Burns & McDonnell
Guest	White	Elliot	SD Myers
Guest	White	Joe	Power Engineers
Guest	Wirtz	Kevin	Cargill, Inc.
Guest	Yang	Fei	Hitachi Energy
Guest	Yuan	Guang	Hitachi Energy
Guest	Yun	Joshua	Virginia Transformer Corp.
Guest	Zanwar	Anand	Siemens Energy
Guest	Zhang	Shibao	Pcore Electric

32 Guests requesting membership:

Guest	Acosta	Juan	Ergon
Guest	Adams	Kayland	Prolec GE Waukesha
Guest	Bolliger	Dominique	HV Technologies
Guest	Bonn	Mike	Soltex
Guest	Casallas	Camilo	Trench Limited
Guest	DaSilva	Roberto	Cargill, Inc.
Guest	Debass	Samson	EPRI
Guest	Duffy	Jesse	Nashville Electric Service
Guest	Ghosh	Rob	GE
Guest	Gonzalez	Luis	Conduct Industries
Guest	Grooms Hernandez	Brad	Native Transformer Services
Guest	Cano	Sergio	Hammond Power Solutions
Guest	Jensen	Nick	Delta Star Inc.
Guest	Johnson	Christopher	Oncor
Guest	Li	Chao	EATON Corporation
Guest	Lucas, P.E.	Tiffany	Prolec GE
Guest	Montanha	Juliano	Siemens Energy
Guest	Morales-Cruz	Emilio	Qualitrol Company LLC
Guest	Niroula	Ashmita	Ergon
Guest	Pappas	Michael	Roechling Industries
Guest	Patel	Monil	PG&E
Guest	Radu	Ion	Hitachi Energy
Guest	Richardson	Michael	Ameren
Guest	Rossini	Yuri	Siemens Energy
Guest	Rutledge	Chris	Dynamic Ratings, Inc.
Guest	Sen	Cihangir	Duke Energy
Guest	Shaikh	Salahaddin	Hitachi Energy
Guest	Sharp	Michael	Trench Limited
Guest	Stechschulte	Kyle	American Electric Power
Guest	Syed	Ali	ComEd
Guest	Yang	Fei	Hitachi Energy
Guest	Yun	Joshua	Virginia Transformer Corp.

Respectfully submitted,

Anastasia O'Malley
Secretary, Insulation Life Subcommittee

SC Meetings Planning

Spring 2023 Meeting

Milwaukee, WI

General Session

March 20, 2023

Tammy Behrens

Prolec GE

Meetings Subcommittee Chair

SAFETY

**THANK YOU TO OUR
MEETING HOSTS!**

waukesha
a prolec ge company

Dharam Vir & Team



Meeting Attendance

	2020 Spring Charlotte	F20, S21, F21 VIRTUAL	2022 Spring Denver	2022 Fall Charlotte	2023 Spring Milwaukee
Attendees	538 CANCELLED	508 549 526	385 (393 – 8)	535 (544 – 9)	514*
Spouses/ Companions/ Guests			24 (24 – 0)	37 (38 – 1)	24*

*Registrations
as of 3/19/23

Future Meetings



FALL 2023 — October 22-26
Kansas City, MO USA
Westin Kansas City @ Crown Center

SPRING 2024 — March 10-14
Kansas City, MO USA
Hyatt Regency Vancouver

Room Block Open!

Considerations for Future Meeting Sites

- local host
- consideration of # of attendees
- availability of technical tours and activities
- restaurants in walking distance
- international airport
- affordable (for the market)

**THANK YOU TO EVERYONE
THAT UTILIZED THE
TRANSFORMERS COMMITTEE
ROOM BLOCK!**

**NO RFID CHECK-INS FOR
THIS MEETING –
PAPER ROSTERS WILL
BE UTILIZED AGAIN**

WiFi: Hyatt_WiFi
Password:
Hyatt2023

WiFi: IEEETR

Password:

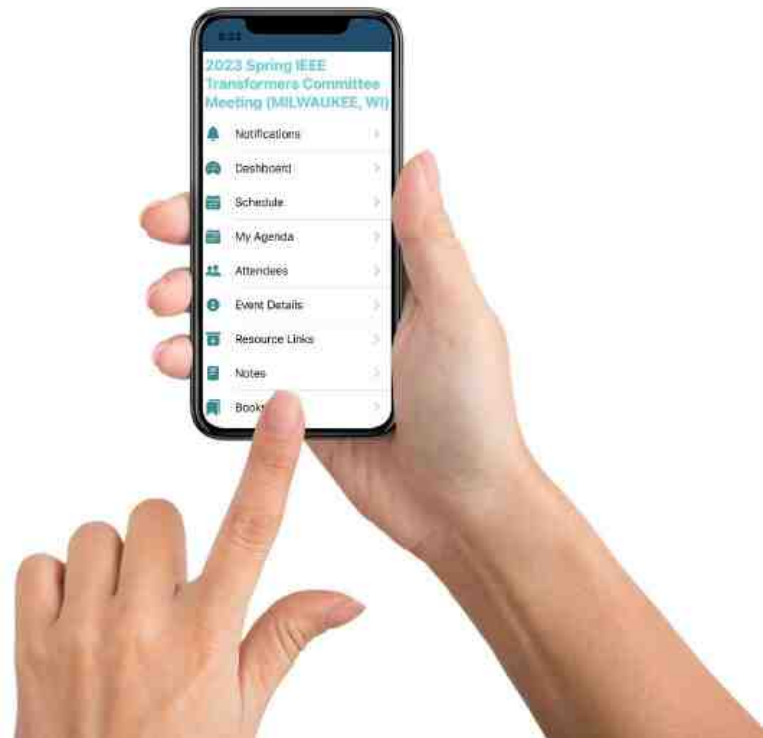
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MEETING APP

IEEE

EventHub

You must login with your IEEE account credentials to see the available events. If you do not have an IEEE login, you can create a free login.



EL&P Delegation

(end users only, please)

Tuesday, 7AM

Crystal

(bring breakfast from Regency CD)

Meetings

Subcommittee Mtg

Wednesday, 7AM

Crystal

(bring breakfast from Regency CD)

Miscellaneous Announcements

Breakfast in Regency CD tomorrow and Wednesday, Atrium on Thursday;
Grab and Go items available for lunch in lobby restaurant on Wednesday

Self-parking – 20% discount QR codes available at registration

Buses for technical tours will load on Martin Luther King Drive –
green awning entrance near Starbucks in lobby

Gluten-free snacks Monday/Tuesday – Registration;
Wednesday – Solomon Juneau

WEBSITE

Username: xfmrcom

**PLEASE CONTACT ME WITH ANY
FEEDBACK, COMMENTS OR
QUESTIONS AT
TAMMY.BEHRENS@PROLEC.ENERGY**

**Thank you for all your work this week
and over the course of the year!**

Annex J Performance Characteristics Subcommittee (PCS)

March 22nd, 2023, Hyatt Regency, Milwaukee, WI

UNAPPROVED MINUTES

Chair: Rogerio Verdolin

Vice Chair: Sanjib Som

Secretary: Kris Zibert

J.1 Introduction / Attendance

Quorum was achieved with 70 members present (66% in attendance). In addition, 98 guests were present at the meeting. The total attendance at the meeting was 168. Guests should contact the Vice Chair to request membership. Their requests for membership and past attendance will be reviewed. If they meet the membership requirements, they will be granted membership before the next meeting in Kansas City, Missouri, October 22-26, 2023.

J.2 Chairman's Remarks

The Chair was unable to attend so the Vice Chair gave the Chairman's Remarks.

The Vice Chair introduced himself and secretary and provided the below updates and comments.

The Vice Chair discussed that the meeting would be recorded for minutes purposes and then deleted.

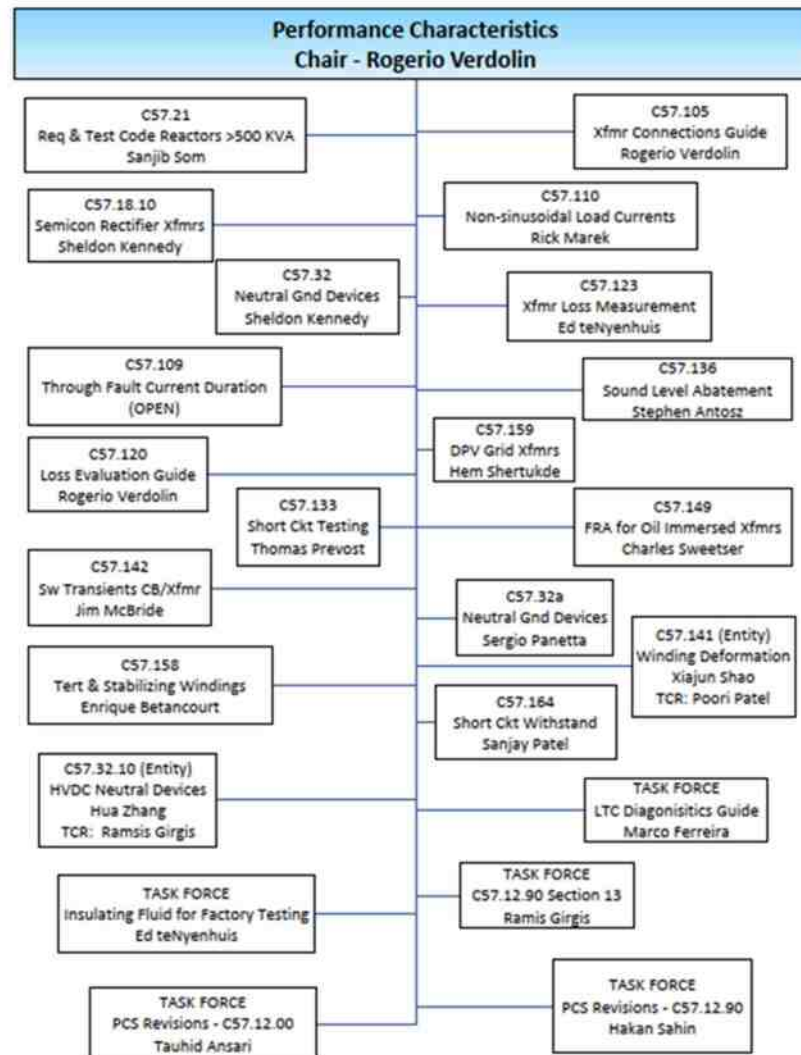
The Vice Chair asked anyone with new business to submit in writing prior to the meeting.

PCS Responsibilities: Defined by the Transformers Committee Organization and Procedures Manual.

The Performance Characteristics Subcommittee shall be responsible for the following:

- Studying and reviewing the treatment of loss, impedance, exciting current, inrush current audible sound and vibration, and other performance characteristics and their methods of application, measurement, or test for liquid filled transformers and liquid filled and dry type reactors.
- Studying and reviewing the treatment of the performance characteristics of other special use transformers e.g. photovoltaic, wind, and rectifier transformers.
- Developing and maintaining related standards, recommended practices, and guides for such criteria
- Coordinating with other technical committees, groups, societies, and associations as required

Standards Supported by PCS:



- C57.12.00 – TF to provide PCS revisions – T. Ansari
- C57.12.90-2015 – TF to provide PCS revisions – H. Sahin (test code) & R. Girgis (audible sound)
- C57.18.10 – Semiconductor rectifier transformers – S. Kennedy
- C57.21 – Requirements & Test Code For Shunt Reactors >500kVA – S. Som
- C57.32-2015 – Neutral Grounding Devices (2025) – S. Kennedy
- C57.32a – Neutral grounding devices – S. Panetta
- C57.32.10 - new Entity PAR - WG Neutral Grounding Reactors Guide for HVDC Converter Transformers – H. Zhang (TCR: R. Girgis)
- C57.105 – Transformer connections guide – R. Verdolin
- C57.109 – Through Fault Current Duration – OPEN
- C57.110 – Xfmr Capability when Supplying Nonsinusoidal Load Currents – R. Marek
- C57.120 – Guide for loss evaluation – R. Verdolin
- C57.123 – Transformer Loss Measurement – E. teNyenhuis
- C57.133-exp – Guide for Short Circuit Testing (Expired – now covered by C57.12.90) – T. Prevost
- C57.136 – Sound Abatement Guide – S. Antosz

- C57.141 - Entity - Winding Deformation – X. Shao (TCR: P. Patel)
- C57.142 – Switching Transients Circuit breaker/Transformer – J. McBride
- C57.149 – New SFRA Guide (2022) – C. Sweetser
- C57.158 – Tertiary & Stabilizing Windings (2027) – E. Betancourt
- C57.159 – DPV Transformers (2026) – H. Shertukde
- C57.164 – Short Circuit Withstand (in development) – S. Patel
- TF for Insulating Fluid for Factory Testing – E. teNyenhuis
- TF for LTC Diagnostics Guide – M. Ferreira
- 60076-16 – Wind Turbine Generator Transformers – P. Hopkinson

Status of Active PAR's:

- 2022 PAR's
 - C57.32.10 Entity WG Guide for the Selection of Neutral-Grounding Devices for HVDC Converter Transformers (PAR Extension Requested)
 - C57.149 SFRA Guide (PAR Extension Requested)
- 2023 PAR's
 - C57.142 Transient Guide (Ballot Invitation Complete)
- 2024 PAR's
 - C57.105-2019/Cor 1 (New WG)
 - C57.149 SFRA Guide (Ballot Invitation Complete)
- 2025 PAR's
 - C57.136 Audible Sound Guide (Recirc Ballot Complete)
 - C57.141 Entity WG Guide for Detection, Monitoring and Evaluation of Winding Deformation
- 2027 PAR's
 - C57.32 Neutral Grounding Devices (New WG)

Status of Standards without active PARs

- C57.159-2016 – DPV Transformers (2026)
- C57.120-2017 – Loss Evaluation Guide (2027)
- C57.158-2017 – Application of Tertiary and Stabilizing Windings Guide (2027)
- 60076-16-2018 – Wind Turbine Generator Transformers (2028)
- C57.109-2018 – Through Fault Current Duration (2028)
- C57.110-2018 – Xfmr Capability when Supplying Nonsinusoidal Loads (2028)
- C57.105-2019 – Transformer connections guide (2029)
- C57.123-2019 – Loss Measurement Guide (2029)
- C57.164-2021 – Short Circuit Withstand Guide (2031)
- C57.21-2021 – Shunt Reactors over 500kVA (2031)
- C57.18.10-2021 – Semiconductor Rectifier Transformers (2031)

Performance Characteristics Subcommittee Membership Requirements

- Voting membership may be requested and granted after attending three of the last five meetings.
- If a voting member misses two consecutive meetings, his or her voting privileges may be revoked. Notification will be sent if voting privileges are revoked.
- Refer to TC P&P 4.3.1 for more information.

Performance Characteristics Subcommittee WG / TF Leaders

- Issue agenda at least 30 days ahead of time
- Minutes are due in 15 days, please get a rough draft of them to us today in MS Word (not PDF) format
- Please keep your webpages up to date – review regularly and send any content/files to tc-webmaster@ieee.org.
- A patent and copyright call must occur at every WG/TF meeting

Performance Characteristics Subcommittee Meeting Minutes

- Name of the group, time, date, and location of meeting
- Officers' names, meeting participants, and member status
- Chair's remarks and reminders of IEEE policies (Patent and Copyright)
- Approval of minutes of previous meeting and agenda
- Technical topics: Brief summary (discussions and conclusions, motions exactly as they are stated, including the names of mover and seconder, and the outcome of each motion)
- Action items, items reported out of executive session
- Recesses and time of final adjournment
- Next meeting—date, time, and location

WG / TF Balloting Reminder

- Working Groups must achieve a 2/3 majority to submit a document for Sponsor Ballot.
- The Subcommittee must achieve a simple majority to submit a document for Sponsor Ballot.

Attendance / Membership – moved to Guest status

The following 7 Members missed the past 2 meetings and have been moved to “Guest” status:

▪ Raj Ahuja	▪ Mohmed Ali Masood Cheema
▪ Florian Faur	▪ Marcos Ferreira
▪ Said Hachichi	▪ Vinay Mehrotra
▪ Brian Penny	

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

The following Guests requested membership at the Fall 2022 meeting and have attended the past 2 of the last 3 meetings.

▪ Steven Brzoznowski	▪ David Caverly
▪ Sarama Hoffman	▪ Ramadan Issack
▪ Markus Schiessl	▪ David Wallach

Attendance / Membership – Quorum determination

- Current breakdown of the Subcommittee:
 - 106 Members
 - 54 are needed for a quorum
- Quorum was established with 71 members in attendance.

J.3 Approval of Agenda

The Chair presented the agenda and entertained a motion to approve. The agenda had been sent to the members by email several weeks prior to the meeting. The motion was made by H. Shertukde and seconded by T. Ansari. The motion passed by unanimous consent.

J.4 Approval of Last Meeting Minutes

The Chair presented the minutes of meeting held in October 2022 and entertained a motion to approve. The minutes had been sent to the members by email several weeks prior to the meeting. The motion was made by M. Roussell and seconded by A. Chakraborty. The motion passed by unanimous consent.

J.5 Minutes from Working Groups and Task Force

The following WG and Task Force reports were received (the reports are appended later).

• WG Guide for FRA for Liquid Filled Transformers C57.149	Charles Sweetser
• WG IEEE Neutral Grounding Devices PC57.32	Sheldon Kennedy
• TF Audible Sound Revs & WG Sound Guide C57.136 (S. Antosz)	Ramsis Girgis
• TF Continuous Revisions to C57.12.00	Tauhid Ansari
• TF Continuous Revisions to Test Code C57.12.90	Hakan Sahin
• WG Sw Transients Ind by TR/Bkr Interaction PC57.142	Jim McBride

Below are highlights that were discussed at the PCS meeting:

1) **WG Guide for FRA for Liquid Filled Transformers C57.149** **C. Sweetser**

Highlights:

Meeting held Monday at 9:30 AM

- 62 in attendance, 31 members on the roster, 17 members attended, a quorum was achieved.
- The PAR is extended to 2024. Currently in ballot process. Mandatory Editorial Coordination (MEC) and ballot invitation are complete.
- Created Ballot Resolution Group that will address comments after first ballot is circulated.

2) **WG IEEE Neutral Grounding Devices PC57.32** **S. Kennedy**

- This is the first meeting of the WG: 27 attendees; 24 requested membership.
- IEEE Patent Policy Slides and Code of Conduct presented
- Introduction of WG officers
- Presentation of Agenda and Minutes from Fall 2022 TF Meeting (approved without objection)
- The Chair requested volunteers for each device covered within the standard and created the following task force leadership:
 - Neutral Grounding Reactors – Camilo Casallas / Saif Hossain
 - Ground Fault Neutralizers – Klaus Pointner
 - Neutral Grounding Transformers – Don Ayers / Jusuf Krvavac
 - Neutral Grounding Resistors – Ryan Hogg / Sergio Panetta / Jusuf Krvavac
 - Combinational Devices – Sergio Panetta
- New Business – liaison with CSA, IEC and other TC groups (C57.12.00 / 12.90, etc.)
- Meeting adjourned at 5:55 PM

3) TF on PCS Continuous Revisions to C57.12.00

T. Ansari

Meeting Date / Time : March 20, 2023, @ 3:15PM to 4:30PM

- 86 total attendees, consisting of 36 Members (out of 58) and 50 Guests; a quorum was established; 17 Guests requested membership.

Highlights:

- Old Business
 - WG Item 112, Clarification on $\pm 0.5\%$ tolerance of ratio of three phase transformer, originally submitted by Ryan Hogg.
 - Work is not completed. Discussion will resume in next meeting.
 - WG Item 113, Measurement of auxiliary loss, originally submitted by Ajith Varghese: Some disconnect noticed between what different manufactures are doing for measuring auxiliary and control losses – based on how “integral parts of transformers” is interpreted.
 - It was determined the auxiliary losses need to be split. TF was not prepared to do this at the present meeting. A meeting invitation was sent to Utilities and manufacturers; three meetings are scheduled. Verbiage will be established after these meetings and discussed at the next meeting.
- New Business
 - Andrew Larison from Hitachi suggested adding Section 4.1.10 on DC current injection limit on the distribution transformer. R. Girgis presented TF needs to think about the percentage and the DC current injection limit based on differences in current injection. R. Girgis accepted the request to do more work on it. He will present next meeting.
 - New business was brought to the TF by Ryan to address Table 11 of Section 7. The kVA is different from single phase to three phase. It does not match in two rows. S. Patel mentioned a calculation to come up with it. E. teNyenhuis researched and found we have had this table since 1987. TF will address this at the next meeting.
- The meeting was adjourned at 4:30.

4) WG on Noise Guide C57.136

S. Antosz

- Went to ballot at the end of November and closed February 3, 2023, with a 75% return rate (77 of 102) and 98% approval rate (70 approve; 1 disapprove; 6 abstentions).
- 59 comments received and worked through by Ballot Resolution Group (BRG) consisting of working group officers.
- The significant technical comments from the initial ballot were presented for discussion at the WG meeting in Milwaukee.
- New draft was created and recirculated February 27, 2023, with 100% approval rate.
- Two minor comments received from recirc. No additional recirc needed. The guide is finalized and will be submitted to REVCOM.
- This meeting was the last meeting of the working group.
- The WG met as scheduled. The meeting was attended by 32 members (out of 46), and 30 guests, for a total of 87 persons. A quorum was established with $32 / 46 = 70\%$ attendance. The agenda was unanimously approved as was the unapproved minutes from the previous meeting.

5) TF C57.12.90 Cont. Revision to Audible Sound

R. Girgis

- Received three comments from original ballot. R. Girgis presented text to address these comments at the scheduled TF meeting.

- First comment regarded no load noise. R. Girgis proposed text for the change, and it was accepted with some changes.
- No standard currently exists for averaging sound pressure measurements. TF decided to add ambient sound pressure measurements logarithmically. There was a request to add the equation for the calculations. This equation will be added to the revision.
- The third comment addressed that there is no current standard for measuring load audible sound level for ONAN-rated transformers. A statement was added to measure ONAN-rated transformers at the ONAN measuring contour.
- Barry Beaster, TF secretary, submitted his resignation. Mats Bernesjo is the new secretary of the TF.
- A motion was suggested to pass the changes made by the TF upon presentation of exact verbiage.

6) TF on Inverter Transf Precautions on Ground Shields C57.159 P. Hopkinson

Highlights:

- Second meeting held on Monday 3/20/23, 4:45 PM
- 100+ attendees
- 2 main issues discussed:
 - Transformers with Y inputs and grounded neutrals failed
 - Moving this activity into C57.159
- P. Hopkinson made a motion and D. Sauer seconded to revise C57.159. It became evident that a revision would not satisfy all of the task force's desires. D. Sauer made a motion and K. Zibert seconded to table indefinitely. D. Sauer moved the previous question with K. Zibert seconding. Motion passed by a show of hands. The motion to table indefinitely passed by unanimous consent.
- Task force will go back and perform a study to create a title, purpose and scope for a revision to C57.159 and bring back a motion to the subcommittee to get a PAR.

7) TF on PCS Continuous Revisions to Test Code C57.12.90 H. Sahin

- Meeting held at 9:30 am to 10:25 am.
- Total attendance = 109
- Members = 27/58; No quorum, Guests = 82
- All old businesses were concluded. TF reviewed Clause "5.1 Determination of cold temperature" with a possibility of bringing clarity to the method for temperature measurement for cold resistance. TF agreed to continue to work on this and propose a revision for next meeting.
- No new business.

6) WG on HV & EHV Breaker & Transformer Sw. Transients C57.142 J. McBride

- Quorum not achieved (23/46 Members present). 67 guests with 11 requesting membership.
- Agenda was approved. The minutes of Fall 2022 meeting were also approved.
- New Draft 11 created from the 305 comments received from ballot. Draft 11 addresses 276 comments.
- Comment Resolution Group went over 29 remaining comments. Group has members from both the Transformers and Switchgear Committees.

- Six of the 29 unaddressed comments were presented and discussed. A proposed resolution to most of these comments was agreed on by those in attendance. Based on discussions, we have approximately 23 comments and 10 figures to resolve and update.
- Mitigation Methods Task Force Update – the full list of mitigation methods were presented. Further consideration is being given to adding “*Redesign of transformers to move resonant point*” as a mitigation method. A suggestion was made to develop a presentation to communicate these methods to the Dielectric Test and Performance Characteristics Subcommittees.
- Meeting adjourned at 12:15 PM.

J.6 Unfinished (Old) Business

Study Group for Continuous Unbalanced Current Operation (Chair: Enrique Betancourt)

- The Group did not meet; the Chair needs to prepare a “critical mass of information” with support of more volunteers before the first meeting.
- Objective of the Group is “To investigate about relevance of considering continuous unbalanced loading of power transformers as subject of standardization within IEEE TC”
- Background
 - Power transformers at generation/transmission levels operate with “balanced” currents, as rotary generators can withstand limited amount of unbalance of line currents (in order of a few %).
 - Two types of load unbalance: line-to-line and line-to-neutral; the latter might have impact on transformers (zero-sequence flux). Distribution networks operators deal with this issue at low-power level (see, for instance NREL Rep. “Modeling and Testing of Unbalanced Loading and Voltage Regulation”, 2007).
 - Some utility representatives believe that electronic converters would eventually be capable to maintain large-power delivery under unbalanced conditions.
- Highlights
 - C57.12.00 does not consider continuous unbalanced loading as abnormal operating conditions (IEC 60076-1 does consider it); it however provides criteria for default dimensioning of stabilizing windings, in case loading not specified.
 - C57.105 and other documents provide recommendations related to unbalanced loading of specific, sensitive transformer connections.
 - IEEE On-Line Dictionary includes definition for “unbalanced loading” taken from Std. C57.158-2017.
- Next Steps
 - “Unbalanced loading” survey among PCS.
 - Confirm relevance of available information to form a TF (identify co-Chair and Secretary). **On-line meeting** with participation of interested individuals (please send e-mail to ebetanco@ieee.org, before April 30, 2023).

J.7 New Business

- E. Betancourt made a motion to approve creating a PAR for a revision to C57.158, seconded by J. McBride. Motion passed by unanimous consent.
- J. Kazmierczak made a motion to create a Task Force to form a PAR study group to look at creating a new guide that covers CO₂ emissions in the construction of transformers. Seconded by T. Ansari.
 - Discussion was had revolving around what the definition of CO₂ emissions are, if it belongs in this Subcommittee, etc.
 - After discussion a vote was held and the motion passed by a show of hands.

J.8 Adjournment

- The meeting was adjourned at 4:15PM.

J.9 Minutes of Meetings of Working Group (WG) and Task Force (TF) Reports (all unapproved)

J.9.1 WG Guide for FRA for Liquid Filled Transformers C57.149

Working Group “Guide for FRA for Liquid-Filled Transformers” C57.149 (Performance Characteristics Sub-Committee)

Meeting Date/Time: March 20, 2023 0930 H

Meeting Location: Milwaukee, WI

Chairman: Charles Sweetser [CS] (Omicron)

Vice-Chair: Poorvi Patel (EPRI)

Secretary: James Cross (Kinectrics)

Meeting was convened at 0930 H by Chairman Charles Sweetser with 62 total attendees, consisting of 17 members and 45 guests. A quorum (17/31) was achieved.

AGENDA

1. Introductions and Attendance Sheets
2. IEEE-SA Standards Board Bylaws on Patents in Standards
3. Approval of Minutes from October 17, 2023
4. Approval of Agenda
5. Discussions
 - a. Ballot Process Update
 - b. Seeking motion to create Ballot Resolution Group
7. Old Business
8. New Business
9. Adjourn

CS reviewed the IEEE Working Group meeting guidelines and the standard patent disclosure info. (No response from attendees to request for patent info.)

The membership list shows 31 WG members.

The agenda and minutes were approved:

Agenda - Diego Robalino moved; seconded Paminder Panesar, carried unanimously.

Minutes - Mickel Saad moved; seconded by Diego Robalino, carried unanimously.

Noted Discussions:

CS reviewed the editorial changes required by MEC.

- a. Updating all dates in the copyright statements on the first page, the header, and the footer.
- b. Reviewing and revising the use of ensure, ensuring, and minimize.
- c. Add the new mandatory Word Usage subclause in Clause 1.

CS reviewed the results of the Ballot Invitation. 102 joined the group and it is balanced.

Motion to create a ballot resolution group:

Mani Kumar moved; seconded Mario Locarno, carried unanimously.

The following individuals have volunteered for the BRG: Wes Schrom, Mario Locarno, Diego Robalino, Kumar Mani, Evgenii Ermakov, Rakesh Patel, Abdulmajid Shaikh

Meeting adjourned at 0950 H

List of meeting participants with membership status at the end of the meeting:

Charles Sweetser	Omicron	Member
Poorvi Patel	EPRI	Member
James Cross	Kinectrics	Member
Fernando Leal	Prolec GE	Member
Mario Locarno	Doble	Member
Akash Joshi	Mott MacDonald	Member
Will Knappek	Omicron	Member
Jonathan Sinclair	PPL	Member
Scott Reed	MVA	Member
Kumar Mani	Duke Energy	Member
Evgenii Ermakov	Hitachi Energy	Member
Ajith Varghese	Prolec GE	Member
Diego Robalino	Megger	Member
Mickel Saad	Hitachi Energy	Member
Parminder Panesar	Virginia Transformer	Member
James McBride	JMX High Voltage	Member
Ismail Guner	Hydro Quebec	Member
Anthony Natale	HICO	
Brian Sparling	Dynamic Ratings	
Marco Espindola	Hitachi Energy	
Eric Davis	Burns & McDonnell	
Qasim Khan	NEETRAC-GT	
Bernard LaBean	Consumers Energy	
Raymond Frazier	Ameren	
Michael Richardson	Ameren	
Daniel Crockett	Ameren	
Cole Van Dreel	ATC	
Alaor Scardazzi	Siemens Energy	
Justin Mimikel	Eaton	
Roger Hayes	GE Grid Solutions	
Tommy Spitzer	City Transformer	
Deanna Woods	Alliant Energy	
Mauricio Soto	Hitachi Energy	
Kayland Adams	Waukesha	
Kannan Veeran	Virginia Transformer	
Thrinadha Katapalli	Virginia Transformer	
Jesse Duffy	Nashville Electric Service	
Cameron Vant	Prolec GE	
Vivek Bhatt	Prolec GE	
Jusuf Krvavac	Sargent & Lundy	
Bertrand Poulin	Hitachi Energy	
Chris Slattery	First Energy	
Stephanie Denzer	Weidmann	
Brian McBride	Cargill	

Eduardo Tolcachir
Monil Patel
Jorge Cantu
Bruce Forsyth
Abdulmajid Shaikh
Kevin Wirtz
Drew Welton
Lorna Gara
Juliano Montanha
Polo Orozco
Salahuddin Shaikh
Duvier Bedoya
Evan Knapp
Rakesh Patel
Rich Frye
Alex Alahmed
Gabriel Mamede
Fabian Stacy

TTE
PG&E
Alliant Energy
Bruce Forsyth and Associates, LLC
Delta Star
Cargill
Intellirent
Shermco
Siemens Energy
GE Grid Solutions
Hitachi Energy
Hitachi Energy
Eaton
Hitachi Energy
Eaton
Evergy
Siemens Energy
Hitachi Energy

Respectfully submitted,

Charles Sweetser
Chair
C57.149 WG

J.9.2 WG PC57.32 Neutral Grounding Devices

IEEE Neutral Grounding Devices Working Group Meeting

Meeting Date/Time: March 21, 2023 4:45 PM – 6:00 PM

Meeting Location: Milwaukee, Wisconsin

Chairman: Sheldon P. Kennedy

Vice-Chair: Thomas Melle

Secretary: Ed teNyenhuis

1. Welcome and Chair's Remarks
2. Circulation of attendance sheets. (Quorum achieved – 25 of 25 new Members; 2 Guests present)
3. Patent Call
4. Copyright and IEEE Ethics Policies
5. Approval of minutes from previous Task Force. (Motion to approve by Don Ayers, Second by Klaus Pointner – motion passed without objection)
6. Introduction of New Officers and WG
7. Review of PAR Approval from NESCOM
8. TF Leader Assignments
 - Neutral Grounding Reactors** – Camilo Casallas, Saif Hossain
 - Neutral Ground Fault Neutralizers** – Klaus Pointner, Sheldon Kennedy
 - Neutral Grounding Transformers** – Don Ayers, Jusuf Krvavac
 - Neutral Grounding Resistors** – Ryan Hogg, Sergio Panetta
 - Combinational Devices** - Sergio Panetta, Jusuf Krvavac
9. Old Business
 - Reminder that all IEEE Standards and Guides require permission for drawings and diagrams. The approval forms can be downloaded from IEEE.org per Maria Zaman.
10. New Business
 - Preliminary discussions of different test sections including impedance of zig-zag transformers (Sergio Panetta); relationship of HVDC and instrument transformers to NGT's and the possible inclusion of the effects of switching transients in the new Standard (Jim McBride and Tom Melle).

- Brief discussion of the importance of the test sections of C57.12.00 and 12.90. Further discussion of whether it may be possible to create a single section for all tables containing test voltages; the Vice-Chair and Chair commented that this was considered in the prior revision of the Standard and found to be difficult considering the variety of Neutral Grounding Devices.
- Brief discussion of relationship to CSA (C22.2 No. 295-15, Neutral Grounding Devices) and IEC (60076-25:2023, Neutral Grounding Resistors). Each TF will review relevant standards and guides.
- The incorporation of active Ground Fault Neutralizers will be looked into by the GFN TF (Klaus Pointner)
- Future remote meeting notices will be clarified and posted on the WG website

11. Next in-person meeting – Fall 2023 (IEEE TC October 23rd-26th in Kansas City, MO)

12. Adjournment at 6 PM CDT (motion by Don Ayers; Seconded by Sergio Panetta)

List of Meeting Attendees from Spring 2023 meeting (including affiliation & member status).

Anton Koshel	Delta Star	Guest
Areeb Wazir	Eaton	Guest
Sheldon Kennedy	Niagara Transformer	Chair
Thomas Melle	HIGHVOLT	Vice-Chair
Robert Arritt	EPRI	Member
Donald Ayers	Ayers Consulting	Member
Sankey Bolar	ONCOR	Member
Susan Bonfiglio	WAPA	Member
Camilo Casallas	Trench Ltd.	Member
Arup Chakraborty	Delta Star	Member
Juan Carlos Cruz Valdes	Prolec-GE Waukesha	Member
Huan Dinh	Hitachi Energy	Member
Ryan Hogg	Bureau of Reclamation	Member
Darren Hoppins	SensorLink	Guest
Saif Hossain	Trench Ltd.	Member
Jusuf Krvavac	Sargent & Lundy	Member
Jim McBride	JMX High Voltage	Member
Sergio Panetta	I-Gard Corp.	Member
Klaus Pointner	Trench Austria	Member
Ulf Radbrandt	Hitachi Energy	Member
Kyle Stechschulte	AEP	Member
Mike Sharp	Trench Ltd.	Member
Cody Vanwyck	Commonwealth Associates	Member
Trenton Williams	Advanced Power Technologies	Member
Alan Washburn	Burns & McDonnell	Member
Maria Zaman	IEEE	Guest
Kris Zibert	Allgeier, Martin & Assoc.	Member

J.9.3 TF PCS Continuous Revisions to Test Code C57.12.90

Working Group “PCS Task Force Continuous Revision to Test Code C57.12.90” (Performance Characteristics Sub-Committee Working Group Report)

Meeting Date/Time: March 21, 2023 9:30 AM – 10:45 AM

Meeting Location: Milwaukee, Wisconsin

Chairman: Hakan Sahin

Vice-Chair: Pugal Selvaraj

Secretary: Adam Sewell

Meeting was called to order at 9:30 AM, March 21, 2023.

1. Administrative

- a. IEEE Patent Policy and Call for Patents and IEEE SA Copyright Policy
 - i. No comments from group
- b. Review of Spring 2023 agenda
 - i. No comments from group
- c. Introductions of the attendees
 - i. Attendance sheets were passed out. Due to time constraints, chair did not have each attendee announce their name/affiliation. Name/affiliation was announced as attendees spoke during the meeting.
 - ii. Secretary asked all who wanted on email distribution for the C57.12.90 PCS Task Force to send him an email at: adamsewell@ieee.org
- d. Updated membership review and count for quorum
 - i. 58 members were listed and 23 were counted as present by hand count. Based on the hand count, the chair announced there was NO QUORUM for this meeting.
 - ii. Attendance sheets after meeting completed showing 26 members attended.
 - iii. **Members are expected to attend and stay in the meeting so business can be conducted.**
 - iv. **Member requests should be sent to secretary – adamsewell@ieee.org**
- e. Approvals needed but not made due to lack of quorum – chair will email out to members for approval:
 - i. Spring 2022 unapproved minutes
 - ii. Fall 2022 unapproved minutes
 - iii. Spring 2023 agenda

2. Old Business

- a. All old businesses were completed and no additional new business was brought up from the group

3. New Business

- a. Chair opened up discussion on “Clause 5.1: Determination of cold temperature” with a possibility of bringing clarity to the tools and methods for temperature measurement for cold

resistance to clarify the verbiage; “As accurately as possible”, as seen below from the current document.

5.1 Determination of cold temperature

The cold temperature of the winding shall be determined as accurately as possible when measuring the cold resistance. The precautions in 5.1.1, 5.1.2, and 5.1.3 shall be observed.

5.1.1 General

Cold-resistance measurements shall be made on a transformer only when the liquid or winding temperature is stable. The temperature is considered stable if the top liquid temperature does not vary more than 2 °C in a 1 h period.

Group agreed to continue to work on this and propose a revision.

- i. Task force – Hakan Sahin, Kerwin Stretch, Leopoldo Rodriguez
 - b. Kumar Mani brought up a question/discussion about “Insulation Resistance Test” values to be added to the “Certified Test Report”. Group agreed that this goes under C57.12.00
4. Membership changes
 - a. Officers will look at attendance of members and change membership based on attendance before Fall 2023 meeting.
 - b. Secretary will work on completing missing information from attendance lists and email lists for this task force until new IEEE TC membership system is functional.
5. **Next meeting: October 24, 2023, at Fall 2023 Transformer Committee Meeting scheduled for October 22-26, 2023, Kansas City, MO, USA.**
6. Close of meeting
 - a. Meeting adjourned at 10:45am
7. Attendee’s list is provided in Annexure - A

Submitted by: Hakan Sahin Date: 04/08/2023

Meeting Attendance:

Kayland Adams	Prolec-GE Waukesha	Guest-RM2
Alex Alahmed	Evergy	Guest-RM1
Tauhid Ansari	Hitachi Energy	Guest
Stephen Antosz	Stephen Antosz & Associates, Inc.	Member
Elise Arnold	SGB	Member
Javier Arteaga	Hitachi Energy	Member
Alex Ayala	Power Partners	Guest
Donald Ayers	Ayers Transformer Consulting	Member
Gilles Bargone	FISO Technologies Inc.	Guest-RM2
Chris Baumgartner	We Energies	Member
Duvier Bedoya	Hitachi Energy	Guest-RM2
Mats Bernesjo	Hitachi Energy	Guest-RM2
JeanNoel Berube		Guest

Enrique Betancourt	Prolec-GE Waukesha	Guest
Daniel Blaydon	Baltimore Gas & Electric	Member
William Boettger	Boettger Transformer Consulting LLC	Member
Sanket Bolar	Oncor	Guest
Christopher Borck	Eaton	Guest
Michael Botti	Hyosung HICO	Guest-RM1
Darren Brown	Howard Industries	Guest
Jorge Cantu	Alliant Energy	Guest
Arup Chakraborty	Delta Star Inc.	Member
Vivian Chan	Hitachi Energy	Guest
Thomas Dauzat	AEP	Guest-RM2
Scott Digby	Duke Energy	Guest
Nikolaus Dillon	Dominion Energy	Guest
Jeffrey Door	The H-J Family of Companies	Guest
Jesse Duffy	Nashville Electric Service	Guest-RM2
Samragini Dutta Roy	Siemens Energy	Guest-RM2
William Elliott	AEP	Member
Qusai Elnimri	Vantran Industries	Guest
Marco Espindola	Hitachi Energy	Guest
Florin Faur	Prolec-GE Waukesha	Guest
Hugo Flores	Hitachi Energy	Member
Raymond Frazier	Ameren	Member
Richard Frye	EATON Corporation	Guest
Renjie Fu	ERMCO	Guest
Ramsis Girgis	Hitachi Energy	Member
Jeff Gragert	Xcel Energy	Guest
Bill Griesacker	Duquesne Light Co.	Member
Ravi Gupta	Megger	Guest-RM1
Michael Hall	Mid Central	Guest
Kyle Heiden	EATON Corporation	Guest
Giovanni Hernandez	Virginia Transformer Corp.	Guest
John Herron	Raytech USA	Member
Samma Hoffman	PPL	Guest
Philip Hopkinson	HVOLT Inc.	Guest
Ramadan Issack	AEP	Guest-RM2
John John	Virginia Transformer Corp.	Member
Christopher Johnson	Oncor	Guest
Sheldon Kennedy	Niagara Transformer	Guest
Stacey Kessler	Ulteig Transformer	Guest
Duritriy Klemptner	Southern California Edison	Guest
Anton Koshel	Delta Star Inc.	Guest
Bernard LaBean Jr.	Consumers Energy	Guest
Mark Lachman	Doble Engineering Co.	Member
Andrew Larison	Hitachi Energy	Guest
Fernando Leal	Prolec-GE Waukesha	Member
Weijun Li	Braintree Electric Light Dept.	Guest
Kumar Mani	Duke Energy	Guest
Kenneth McKinney	UL LLC	Guest
Kent Miller	Retired	Guest
Francis Mills	Power Engineers	Guest
Rhea Montpool	Schneider Electric	Guest

Tyler Morgan	Duke Energy	Guest-RM1
Marta Munoz	Hitachi Energy	Guest
Hugo Murillo	The H-J Family of Companies	Guest-RM1
David Murray	TVA	Member
Ismael Naja	Eaton	Guest-RM1
Dwight Parkinson	EATON Corporation	Guest
George Partyka	PTI Transformers	Guest
Monil Patel	PG&E	Guest-RM1
Sanjay Patel	Smit Transformer	Member
Vinay Patel	Consolidated Edison Co. of NY	Guest-RM1
Harry Pepe	Phenix Technologies, Inc.	Member
Sylvain Plante	Hydro-Quebec	Guest
Jarrold Prince	ERMCO	Guest
Ion Radu	Hitachi Energy	Member
Michael Richardson	Ameren	Guest
Leopoldo Rodriguez	Transformer Testing Services LLC	Guest
Hakan Sahin	Virginia/Georgia Transformer	Chair
Fernando Salinas	Power Partners	Guest
Albert Sanchez	KUB	Guest
Markus Schiessel	SGB	Member
Eric Schleismann	Southern Company	Guest-RM2
Dan Schwartz	Quality Switch, Inc.	Guest
Pugal Selvaraj	Virginia Transformer Corp.	Vice-Chair
Adam Sewell	Quality Switch, Inc.	Secretary
Jeremy Sewell	Quality Switch, Inc.	Guest
Jaber Shalabi	Vantran Industries	Guest-RM1
Mike Sharp	Trench Ltd.	Guest
Ibrahim Shteyh	Shteyh	Guest-RM1
Christopher Slattery	FirstEnergy Corp.	Guest-RM2
Sanjib Som	Pennsylvania Transformer	Guest-RM2
Andrew Steineman	Delta Star Inc.	Guest
Kerwin Stretch	Siemens Energy	Guest-RM2
Marc Taylor	JFE Shoji Power Canada Inc.	Guest
Ed teNyenhuis	Hitachi Energy	Member
Scott Thomas	Hitachi Energy	Guest
Reinaldo Valentin	Duke Energy	Guest
Cole Van Dreel	American Transmission Company	Guest-RM2
Jason Varnell	Doble Engineering Co.	Member
Pragnesh Vyas	Sunbelt Solomon	Guest-RM2
Shelby Walters	Howard Industries	Guest
Bruce Webb	KUB	Guest
Fei Yang	Hitachi Energy	Guest-RM1
Anand Zanwar	Siemens Energy	Guest
Waldemar Ziomek	PTI Transformers	Guest-RM2

J.9.4 WG PC57.136 Noise Guide

Unapproved Minutes of Spring 2023 WG IEEE PC57.136, “Guide for Audible Sound of Liquid-Immersed Power Transformers” and TF “Audible Sound Revision to Test Code”

The WG and TF met at 1:45 PM, on Monday, March 20, 2023, as part of the WG PCS Guide for Audible Sound of Liquid-immersed Power Transformers and PSC Audible Sound Revision to Test Code.

Steve Antosz, Chairman of the WG presided over the meeting with Dr. Ramsis Girgis being the Vice-Chair, and Mats Bernesjo, Secretary.

The Chairman welcomed the audience to this meeting, reviewed the agenda, and initiated an applause thanking Barry Beaster for his many years of service as the secretary of the Task Force. He then announced that Mats Bernesjo is taking over this responsibility as the Secretary of the TF.

The WG meeting was attended by 32 out of 46 members and 30 Guests for a total meeting attendance of 87.

The agenda was unanimously approved as was the unapproved minutes of the Fall 2022 WG meeting in Charlotte.

The Chairman of the WG gave an update of status of the Noise Guide and commented on the last recirculation of the Guide, that was initiated February 27, 2022, for a 10-day duration. A few editorial changes were suggested and incorporated. The only previous negative vote on the ballot was changed into an “approve” vote. He reviewed several ballot comments that are technical in nature and the resolutions. With these final notes, the Chairman stated that the Guide will be finalized and submitted for publication by the WG Chair. He thanked everyone who participated in contributing to the Guide. He also announced that this was the last meeting of the WG as the work is finished. He then turned the podium over to Dr. Girgis for the second part of the meeting.

The TF meeting was attended by 23 out of 40 members and a total meeting attendance of 87. A quorum was established. Eight attendees requested membership at this meeting (listed below) **. The agenda was unanimously approved as was the unapproved minutes of the fall meeting of the TF.

The Chairman then presented and discussed proposed text in response to 3 Technical Comments received when C57.12.90 was originally balloted. Below is the approved proposed text in response to these 3 comments. Note that the text in red is the proposed updated / added text:

Item 1: Proposed modified text in response to comment on “Measuring no-load sound level at the highest sound producing tap position”

When measuring no-load audible sound level, the transformer shall be connected and energized at rated voltage and rated frequency and shall be at no load with the tap changer, if any, on the rated tap position, unless otherwise specified.

When a transformer is equipped with a tap changer, the transformer may, on certain tap changer positions, produce sound levels that are higher than the audible sound level at the rated tap position. For these transformers, the measurements shall be made with the transformer on the highest sound producing tap position.

Also, other excitation conditions may occur in service leading to lower, or higher, core noise. For example, transformers designed to operate with variable flux the core audible sound level is strongly impacted by the tapping position. The same is true for SVC transformers when connected to a Capacitive Load; Again, for these transformers, the measurements shall be made with the transformer operating at the highest sound producing condition.

Item 2: Proposed modified text – Clause 13.5.5.1 Measuring ambient sound pressure level

The ambient sound shall be measured at a minimum of four locations around the transformer immediately preceding and immediately following the sound measurements with the transformer energized. The ambient sound pressure level shall be established by calculating the Logarithmic average of measured values of the ambient sound pressure levels. The measuring instruments shall be in conformance with

Item 3: Proposed text for Clause 13.3.3.2: Load audible sound level**Proposed added text in red**

Since load audible sound becomes a contributor to the total audible sound of the transformer at higher loads, the load audible sound level shall be measured at the ONAF measuring contour. For transformers with only an ONAN rating, load noise is to be measured at the ONAN Sound Measuring Contour.

New business proposed by Ajith Varghese: Look into the IEC Wall Sound Reflection coefficient was developed based on some test results from Prolec GE Waukesha. Vice-Chair Steve Antosz requested that manufacturers of power transformers send him test data, in particular where measurements were made in two different test rooms.

*** They are Gabriel Mamede (Siemens-Energy), Arup Chakraborty (Delta Star), Camilo Casallas (Trench), Subash Tuli (CT&RA), David Murray (TVA), Cole Van Dreel (AEP), Salahuddin Shaikh (Hitachi Energy), and Samson Debass (EPRI).*

With no new additional business raised, the meeting was adjourned upon unanimous approval.

Respectfully submitted,

Mats Bernesjo, WG / TF Secretary

Spring 2022 WG Meeting Attendance and Affiliation is as follows:

Kayland Adams	Prolec-GE Waukesha	Member
Alex AlAhmed	Every Wolf Creek	Guest
Carlos Alonso	Arteche	Guest
Stephen Antosz	Stephen Antosz & Associates, Inc.	Chair
Elise Arnold	SGB	Member
Donald Ayers	Ayers Transformer Consultants	Guest
Jason Beaudoin	Weidmann	Guest
Duvier Bedoya	Hitachi Energy	Guest
Mats Bernesjo	Hitachi Energy	Secretary
Enrique Betancourt	Prolec-GE Waukesha	Member
Edwin Betancourt	Siemens Energy	Guest
William Boettger	Boettger Transformer Consulting LLC	Member
Darren Brown	Howard Industries	Guest
Camilo Casallas	Trench Limited	Guest*
Arup Chakraborty	Delta Star	Guest*
Euhyoung Cho	HICO America	Guest
Daniel Crockett	Ameren	Guest
Juan Carlos Cruz Valdes	Prolec-GE Waukesha	Member
Juan Alfredo Cuyrizales	Prolec-GE Waukesha	Guest
Samson Debass	EPRI	Guest*
Scott Digby	Duke Energy	Member
Jesse Duffy	Nashville Electric Service	Guest
Evgenii Ermakov	Hitachi Energy	Guest

Hugo Flores	Hitachi Energy	Member
Eduardo Garcia Wild	Siemens Energy	Member
Ramsis Girgis	Hitachi Energy	Vice-Chair
Ismail Guner	Hydro-Quebec	Member
Derek Hollrah	Burns & McDonnell	Guest
Saif Hossain	Trench Ltd. – Siemens Energy	Guest
Nicholas Jensen	Delta Star Inc.	Member
John John	Virginia Transformer Corp.	Member
Joshi Akash	Mott MacDonald	Member
Lee Junho	Hyundai Electric	Guest
Jerzy Kazmierczak	Hitachi Energy	Member
Zan Kiparizoski	Howard Industries	Member
Anton Koshel	Delta Star Inc.	Guest
Rafal Kowalski	Hitachi Energy	Guest
Mark Lachman	Doble	Guest
Fernando Leal	Prolec-GE Waukesha	Guest
So-young Lee	Hyundai Electric	Guest
Jose Machain	Prolec-GE Waukesha	Guest
Gabriel Mamede	Siemens Energy	Guest*
Jim McBride	JMX High Voltage	Guest
Francis Mills	Power Engineers	Guest
Marta Munoz	Hitachi Energy	Guest
David Murray	TVA	Guest*
Joe Nims	Allen & Hoshall	Guest
Sanjay Patel	Smit Transformer	Member
Poorvi Patel	EPRI	Guest
Monil Patel	PG&E	Guest
Klaus Pointner	Trench Austria GmbH	Member
Bertrand Poulin	Hitachi Energy	Member
Ulf Radbrandt	Hitachi Energy	Guest
Ion Radu	Hitachi Energy	Guest
Tim Rocque	Prolec-GE Waukesha	Guest
Leopoldo Rodriguez	TTS	Guest
Ronchi Rodrigo	WEG Transformer	Guest
Hakan Sahin	Virginia/Georgia Transformer	Member
Dinesh Sankarakurup	Duke Energy	Member
Daniel Sauer	EATON Corporation	Member
Markus Schiessl	SGB	Member
Eric Schleismann	Southern Company	Guest
Cihangir Sen	Duke Energy	Member
Abdulmajid Shaikh	Delta Star	Guest
Salahuddin Shaikh	Hitachi Energy	Guest*
Michael Sharp	Trench Ltd Canada	Guest
Andre Simons	JFE Shoji	Member
Christopher Slattery	FirstEnergy Corp.	Member
Jonathan Snalgrass	Texas A&M University	Guest
Jason Snyder	FirstEnergy Corp.	Guest
Sanjib Som	Pennsylvania Transformer	Member
Andrew Steineman	Delta Star Inc.	Guest
Troy Tanaka	Burns & McDonnell	Guest
Marc Taylor	JFE Shoji Power Canada Inc.	Member

Subhash Tuli	CT&DA	Guest*
Cameron Vant	Prolec-GE Waukesha	Guest
Ajith Varghese	SPX Transformer Solutions, Inc.	Member
Kannan Veeran	Virginia/Georgia Transformer	Guest
Dharam Vir	SPX Transformer Solutions, Inc.	Member
Mike Waldrop	Memphis Light, Gas and Water	Guest
David Wallach	Duke Energy	Member
Jeffrey Wright	Duquesne Light	Guest
Fei Yang	Hitachi Energy	Guest
Anand Zanwar	Siemens Energy	Guest
Kris Zibert	Allgeier Martin	Guest

**Requested membership*

J.9.5 TF PCS Continuous Revisions to C57.12.00

PCS Task Force on General Requirements C57.12.00

*Performance Characteristics Subcommittee
IEEE / PES Transformers Committee*

*March 20, 2023
Milwaukee, Wisconsin (USA)*

UNAPPROVED MINUTES

The TF PCS Continuous Revisions to C57.12.00 met at 3:15 PM on Monday, March 20, 2023. Chairman Tauhid Ansari presided over the meeting with Enrique Betancourt being the Vice-chair, and Mats Bernesjo acted as Secretary. The meeting was called to order and the Chairman reminded the group of the purpose and scope of this Task Force. The copyright and patent statements from IEEE were presented to the group; none of the members and guests present were aware of any issues related to this TF's activities.

The meeting was attended by 36 members (out of 58), 50 guests, for a total meeting attendance of 86 persons, including 17 requests for membership at this meeting. A quorum was established with $36 / 58 = 62\%$ attendance.

The agenda was unanimously approved (1st Hugo Flores, 2nd David Wallach) as was the unapproved minutes (1st Sanjib Som, 2nd Eduardo Garcia) from the previous meeting (Fall meeting, Charlotte 2022).

The following 17 guests requested membership:

Alan Traut	Howard Industries
Angela Leigl	Eaton Corp
Charles Sweetser	Omicron Electronic Corp, USA
Cole Van Dreel	American Transmission Company
David Murray	TVA
Edward Orozco	GE Grid Solutions
Elise Arnold	Starkstrom Geretebau GmbH
Ion Radu	Hitachi Energy

Michael Botti	Hyosung HICO
Monil Patel	PG&E
Nick Jensen	Delta Star
Nik Dillon	Dominion Energy
Pugal Selvaraj	Virginia Transformers
Raymond Frazier	Ameren
Ryan Hogg	USBR
Samragini Dutta Roy	Siemens Energy
Subhash Tuli	ET&DA

Next, the Chair briefly provided background and relevance of each item brought up for Group's discussion in the agenda. The Chair started Group's regular business.

Next, the Chair briefly provided background and relevance of each item brought up for Group's discussion in the agenda. The Chair started Group's regular business.

WG Item 112, Clarification on $\pm 0.5\%$ tolerance of ratio of three phase transformer

Originally submitted by Ryan Musgrove.

"During the Spring 2022 meeting in Denver, the motion "Create a TF to review Section 9.1 of C57.12.00 and provide recommendation on phase-to-phase ratio tolerance to this task force by Fall 2022" was proposed by Dan Sauer and seconded by Phil Hopkinson. A short discussion preceded the vote: 14 agree, 9 oppose, and 5 abstain. With only 28 votes (out of 33 members), the validity of the vote to pass the motion was questioned (Sanjib Som) since "abstain" votes does not count towards # of votes. A second quorum check (by raised hands) showed that a quorum was no longer maintained within the TF and hence, the motion to create a TF did not pass. However, Ryan Musgrove will spearhead a group with the support of Sanjay Patel."

Unfortunately, the group was not able to meet. Dan Sauer asked to come back to the Chair of this TF before the next meeting (Fall 2023) in Kansas City.

WG Item 113, Measurement of Auxiliary Loss

Submitted by Ajith Varghese:

"I see there is some disconnect between what different manufacturers are doing for measuring control losses – based on how one interprets 'integral parts of transformers'."

We can't have each and every component listed in IEEE, but I think there needs to be some additional clarity needed. Some of the disconnects:

- Heaters
- When dual temp heaters, many are taking only one stage
- Heaters in Cubicles/bus duct (supplied with transformer) are not included
- Heaters in LTC cubicles
- Breathers
- Power for LTC Motor
- Power consumed by N2 generator
- Power consumed by Oil Filters.

Also – Need clarity of inrush/starting power needed for cooling fans, etc."

Present wording from C57.12.00 Sec 5.9.

For Class II transformers (see 5.10), control/auxiliary (cooling) losses shall be measured and recorded. All stages of cooling, pumps, heaters, and all associated control equipment shall be energized, provided these components are integral parts of the transformer.

The group did meet prior to the meeting. Unfortunately, the only Utility (ComEd) in this small workgroup could not attend. Hence, only manufacturers participated. The group came up with some new wording, *The recommended additional paragraph.*

If the device cannot be energized or not present at the time of auxiliary loss measurement, the power information from the data sheet of device shall be identified and included in the total auxiliary losses.

A very interesting and informative discussion was held on this topic with input from both Manufacturers and Utilities. The bottom line of the discussion seemed to be that all losses consumed by the transformer including all associated losses drawn by heaters, tap changer motor, fans, light, etc. must be considered in the total losses of the transformer. The consensus was also that the design of the control cabinet electronics must be such that it would not trip when all accessories are loaded.

The participants in the meeting agreed upon that Ajith Varghese & Tauhid Ansari will go through the wording one more time before the TF can vote on this topic. Dan Blaydon (BG&E), Chris Slattery (FirstEnergy), and Subhash Tuli (ET&DA) will also work with the Chairman on this topic.

WG Item 113, Measurement of Auxiliary Loss

Submitted by Andrew Larison:

“Adding Sec 4.1.10 on DC current injection limits”.

A quick motion to approve (1st Steve Snyder, 2nd Phil Hopkinson) was not voted upon but rather discussed in detail. It appears that the proposed wording includes a 0.5 % DC. Note that, if this is on the secondary side of the distribution transformer, which in a low secondary voltage (480V or 120 V) could be significant (for example, the DC current could be 35 A in a 7000 A low voltage winding) which is not reasonable. First, DC needs to be written out as “Direct Current” before “injection” and there is a need to specify on which side on the transformer this is for (primary / secondary) for sure.

Dr. Ramsis Girgis will help looking into this topic with the focus on determining whether the 0.5 % should be 0.05 %, or different. The proposed wording, *4.1.10 DC Injection for Distribution Transformers.*

Unless otherwise specified the acceptable DC Injection limit shall be 0.5% for distribution class transformers. DC injection is defined in IEEE 1547. Refer to IEEE 1547.2 for the application guide and background information.

does not describe the scope fully which is very dangerous. Steve Antosz proposed to study this topic a little further to gather enough information to take a vote on this which was verbally approved by the audience.

Chairman Tauhid Ansari asked whether there was any new business. Ryan Hogg suggested to look into the background of Table 11 (section 7) due to that some of the information does not appear to make sense.

It appears that some of the KVA information is not correct and has not been updated since at least before 1987. The Chairman will discuss further with Hogg with the support of Dan Sauer.

With a quiet floor, the Chairman asked for the meeting to be adjourned.

Meeting was adjourned at 4:30 PM.

Respectfully submitted,

Tauhid Ansari
WG Chair

Enrique Betancourt
Vice-Chair

Mats Bernesjo
Secretary

Attendance Spring 2023 Meeting – PCS TF to Revision C57.12.00

Kayland Adams	Prolec-GE Waukesha	Guest
Greg Anderson	GW Anderson & Associates, Inc.	Guest
Tauhid Haque Ansari	Hitachi Energy	Chair
Stephen Antosz	Stephen Antosz & Associates, Inc.	Member
Elise Arnold	Starkstrom Geratebau GmbH	Guest (RM)
Donald Ayers	Ayers Transformer Consultants	Guest
Christopher Baumgartner	WE Energies	Member
Jason Beaudoin	Weidmann	Guest
Mats Bernesjo	Hitachi Energy	Secretary
Enrique Betancourt	Prolec GE	Vice Chair
Daniel Blaydon	Baltimore Gas & Electric	Member
William Boettger	Boettger Transformer Consulting LLC	Member
Christopher Borck	Eaton Corporation	Guest
Michael Botti	Hyosung HICO	Guest (RM)
Jeffrey Britton	Phoenix Tech, Div. of Doble	Guest
Samuel Brodeur	Hitachi Energy	Guest
Darren Brown	Howard Industries	Member
Eric Davis	Burns & McDonnell	Guest
Nikolaus Dillon	Dominion Energy	Guest (RM)
Samragini Dutta Roy	Siemens Energy	Guest (RM)
Qusal Einimri	Vantron Industries	Guest
William Elliott	Prolec-GE Waukesha	Member
Hugo Flores	Hitachi Energy	Member
Raymond Frazer	Ameren	Guest (RM)
Eduardo Garcia Wild	Siemens Energy	Member
Ramsis Girgis	Hitachi Energy	Member
Bill Griesacker	Duquesne Light	Guest
Ravi Gupta	Megger	Guest
Michael Hall	Midcentral Electrical	Guest
John Herron	Raytech USA	Member
Ryan Hogg	USBR	Member
Phil Hopkinson	HVOLT Inc.	Member
Nick Jensen	Delta Star Inc.	Guest (RM)
John John	Virginia Transformer Corp.	Member
Christopher Johnson	Oncor	Guest
Akash Joshi	Black & Veatch Inc.	Member

Kevin Juchem	Hitachi Energy	Guest
Sergiusz Kapka	Hitachi Energy	Guest
Jerzy Kazmierczak	Hitachi Energy	Guest
Sheldon Kennedy	Niagara Transformer	Guest
Rafal Kowalski	Hitachi Energy	Guest
Mark Lachman	Doble	Member
Angela Leigl	Eaton Corporation	Guest (RM)
Kevin Mazzei	Black & Veatch Inc.	Guest
Brian McBride	Cargill	Guest
Tom Melle	HVOLT Inc.	Guest
Juliana Montanha	Siemens Energy	Guest
Marta Munoz	Hitachi Energy	Guest
David Murray	TVA	Guest (RM)
Ryan Musgrove	OG&E	Member
Shankar Nambi	Bechtel Energy, Inc.	Member
Joe Nims	Allen & Hoshall	Member
Rudolf Ogajanov	Hitachi Energy	Guest
Eduardo Orozco	GE Grid Solutions	Guest (RM)
George Partyka	PTI Transformers	Member
Sanjay Patel	SMIT Transformers	Member
Monil Patel	PG&E	Guest (RM)
Harry Pepe	Phoenix Technologies, Inc.	Guest
Bertrand Poulin	Hitachi Energy	Member
Jarrod Prince	ERMCO	Member
Ion Radu	Hitachi Energy	Guest (RM)
Rodrigo Ronchi	WEG Transformers	Guest
Marnie Roussell	Entergy	Member
Hakan Sahin	Virginia / Georgia Transformers	Member
Dinesh Sankarakurup	Duke Energy	Guest
Amitabh Sarkar	Virginia Transformers	Member
Alaor Scardazzi	Siemens Energy	Guest
Markus Schiessl	SGB	Member
Jeffrey Schneider	Power Partners	Guest
Pugal Selvaraj	Virginia Transformers	Guest (RM)
John Sen	Duke Energy	Member
AbdulMajid Shaikh	Delta Star Inc.	Guest
Jaber Shalabi	Vantron Industries	Guest
Hemchandra Shertukde	University of Hartford	Guest
Christopher Slattery	FirstEnergy Corp	Member
Andrew Steineman	Delta Star Inc.	Guest
Tuli Subhash	ET&GA	Guest (RM)
Charles Sweetser	Omicron Electronics Corp USA	Guest (RM)
Ed teNyenhuis	Hitachi Energy	Member
Scott Thomas	Hitachi Energy	Guest
Alan Traut	Howard Industries	Guest (RM)
Cole Van Drael	American Transmission Co	Guest (RM)
Ajith Varghese	Prolec-GE Waukesha	Member
Dharam Vir	Prolec-GE Waukesha	Member
David Wallach	Duke Energy	Member
Kris Zibert	Allgeier Martin	Member

J.9.6 WG HV & EHV Breaker & Transformer Sw. Transients C57.142

**IEEE / PES Transformers Committee
Performance Characteristics Subcommittee
WG to Investigate the Interaction between Substation Transients
And Transformers in HV and EHV Applications and Revision of C57.142
Milwaukee, WI
Tuesday, March 21, 2023
11:00 AM – 12:15 PM Central Time Zone – USA
Executive Ballroom (2)
Chairman – Jim McBride
Vice Chair – Xose Lopez-Fernandez
Secretary – Tom Melle**

- 1) Meeting called to order at 11:00 AM Central Daylight Time.
- 2) Welcome and Chair's Remarks
- 3) Circulation of Attendance Sheets - 88 Attendees were present (22 Members were present and 66 Guests)
Quorum was not achieved (24 members present required for quorum)
- 4) IEEE Patent Policy Slides
- 5) Approval of Agenda and Minutes from Fall 2022
- 6) C57.142 SA Ballot and Comment Resolution status – Jim McBride: presentation of open comments before the ballot resolution group (BRG) and discussion of several key comments (latest documents to be posted on WG website).
 - Comment on Page 16, Section 5: alignment of Guide with theory in IEC 62271-306, Section 16.4 (Tom Melle to review)
 - Comment - Page 20, Section 5.2: magnitude of re-ignition versus load power factor. The Chair provided examples of transients in shunt reactors illustrating 1.2 MV(pp) transients on transformer with 1.4 MV BIL (Jeffrey Britton to review)
 - Comment - Page 6, Section 3.4.1: discussion of transient recovery voltages (The Chair and Phil Hopkinson will review/survey with SWG BRG members and any experienced users or manufacturers)
 - Comment - Page 34, Section 7.6: de-energizing transformers with disconnectors (Bertrand Poulin suggested to leave the informative paragraph and insert a note that is can be dangerous to de-energize with switch)
 - Comment - Page 30, Section 7: mitigation method of “moving” the transformer’s resonant frequency (such as with CCVT). A straw ballot was conducted and the results were split. Chair will conduct a survey of the BRG.
 - Comment - Page 33, Section 7.3: controlled switching to mitigate reignitions (the sentence will be rewritten to provide more clarity)

- Comment – Page 5, Section 3.3: discussed “ground-fault neutralizer” terminology. Jeff Britton suggested coordination with WG C57.32. Tom Melle is Vice-Chair of that Standard and will coordinate matching terminology.

7) Mitigation Methods Task Force Update – Jim McBride / Phil Hopkinson

All prior mitigation methods proposed by the TF are included in the Guide. The TF will review/consider CCVT, Capacitive Shields and any other potential mitigation methods suggested by comment resolution.

- 8) New Business – Ajith Varghese suggested preparing an updated presentation for sharing with any liaison groups (SWG, CIGRE, PCS and the TC at-large).
- 9) Next Meeting (Fall 2023 – Kansas City, MO, Oct. 23, 2023)
- 10) Adjournment at 12:15 PM CDT

Spring 2023 WG Meeting Attendance and Affiliation is as follows:

James McBride	JMX High Voltage	Chair
Thomas Melle	HIGHVOLT	Secretary
Enrique Betancourt	Prolec GE	Member
William Boettger	Boettger Transformer Consulting LLC	Member
Jeffrey Britton	Phenix Technologies, Inc.	Member
Eduardo Garcia Wild	Siemens Energy	Member
Kyle Heiden	EATON Corporation	Member
Philip Hopkinson	HVOLT Inc.	Member
John John	Virginia Transformer Corp.	Member
Akash Joshi	Black & Veatch	Member
Egon Kirchenmayer	Siemens Energy	Member
Weijun Li	Braintree Electric Light Dept.	Member
Klaus Pointner	Trench Austria GmbH	Member
Bertrand Poulin	Hitachi Energy	Member
Marnie Roussell	Entergy	Member
Amitabh Sarkar	Virginia Transformer Corp.	Member
Cihangir Sen	Duke Energy	Member
Michael Sharp	Trench Limited	Member
Mike Spurlock	Spurlock Engineering Services, LLC	Member
Ajith Varghese	SPX Transformer Solutions, Inc.	Member
Dharam Vir	Prolec-GE Waukesha	Member
Waldemar Ziomek	PTI Transformers	Member
Robert Arritt	EPRI	Guest
Jean-Noel Berube	Rugged Monitoring	Guest
Christopher Borck	EATON Corporation	Guest
Cole Casey	Invenergy	Guest
Vivian Chan	Hitachi Energy	Guest
Alex Cochran	U.S.E.	Guest
Michael Craven	Qualus Corporation	Guest
Gabriel Delgado Zamora	Invenergy	Guest
Scott Digby	Duke Energy	Guest
Nikolaus Dillon	Dominion Energy	Guest
Paul Dolloff	East Kentucky Power	Guest
Evgenii Ermakov	Hitachi Energy	Guest

Marco Espindola	Hitachi Energy	Guest
Esseddik FerdJallah	Trench Group	Guest
Raymond Frazier	Ameren	Guest
Jose Gamboa	H-J Family of Companies	Guest
Lorne Gara	Shermco	Guest
Miguel Garcia	Hitachi Energy	Guest
Carlos Gaytan	Prolec-GE Waukesha	Guest
Detlev Gross	Power Diagnostix Consultant	Guest
John Harley	FirstPower Group LLC	Guest
JC Hernandez	Georgia Tech – NEETRAC	Guest
Saramma Hoffman	PPL Electric Utilities	Guest
Saif Hossain	Trench Limited	Guest
Patrycia Jarosz	IEEE SA	Guest
Thrinadha Katapalli	Virginia Transformer	Guest
Stacey Kessler	Ulteig Engineers	Guest
Qasim Khan	Georgia Tech – NEETRAC	Guest
Dmitriy Klempner	Southern California Edison	Guest
Evan Knapp	EATON Corporation	Guest
Bernard Labeau, Jr.	Consumers Energy	Guest
Mark Lachman	Doble Engineering Co.	Guest
Kumar Mani	Duke Energy	Guest
Omar Mendez	Prolec-GE Waukesha	Guest
Marian Mohamed	XCEL Energy	Guest
Juliano Montanha	Siemens Energy	Guest
Paul Mushill	Ameren	Guest
Joe Nims	Allen & Hoshall, Inc.	Guest
Dwight Parkinson	EATON Corporation	Guest
Monil Patel	PG&E	Guest
Uros Pleceyic	Invenergy	Guest
Goran Plisic	Siemens Energy	Guest
Ulf Radbrandt	Hitachi Energy	Guest
Ion Radu	Hitachi Energy	Guest
Bradley Rainbolt	EATON Corporation	Guest
Ana Restrepo	Hitachi Energy	Guest
Michael Richardson	Ameren	Guest
Tim Rocque	Prolec-GE Waukesha	Guest
Rodrigo Ronchi	WEG-Voltran	Guest
Markus Schiessl	SGB	Guest
Salahuddin Shaikh	Hitachi Energy	Guest
Hemchandra Shertukde	University of Hartford	Guest
Ibrahim Shteyh	Consultant	Guest
Stephen Shull	BBC Electrical Services, Inc.	Guest
Fabian Stacy	Hitachi Energy	Guest
Brad Staley	Leeward Renewable Energy	Guest
Andrew Steineman	Delta Star Inc.	Guest
Eduardo Tolcachir	TTE	Guest
Cameron Vant	Prolec-GE Waukesha	Guest
Jos Veens	SMIT Tranformatoren B.V.	Guest
Alan Washburn	Burns & McDonnell	Guest
Eric Weatherbee	PCORE Electric	Guest
Joshua Yun	Virginia Transformer Corp.	Guest

Malia Zaman
Shibao Zhang

IEEE
PCORE Electric

Guest
Guest

J.9.7 TF Inverter Transformer Precautions on Ground Shields C57.159

TF Inverter Transformer Precautions on Ground Shields C57.159

Unapproved Meeting Minutes

Spring 2023 Meeting

Milwaukee, WI

4:45 pm, Monday, March 20

A. Introduction:

- 1. PJ Hopkinson. Task Force Leader**
- 2. Hemchandra Shertukde: Past Chair of IEEE C57.159 & Proposed New Chair**
- 3. Jonathon Stewart: Secretary, NEMA Staff**

B. Minutes of Meeting held in Charlotte

C. Attendance was recorded on the roll

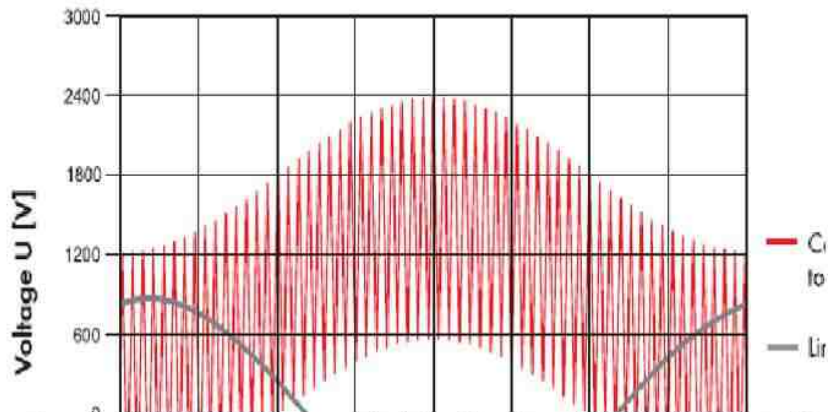
D. Technical Presentation on Inverter transformer Issues in C57.159

1. Paragraph 5.1.2:

- a. Needs to state that inverters are well filtered line to line and line to neutral but are not filtered line to ground.
- b. Needs to provide for inverters for IGBT switching devices that have pulse rates from 2 kHz to 20 kHz, with peak amplitudes from -2500 volts to + 2500 volts.

High Frequency Inverter with grounded neutral

- The power connection used must have suitable insulation resistance since voltages to ground most occur when the inverter is in pulsed mode (see Section 4.1 "Technical data of the inv



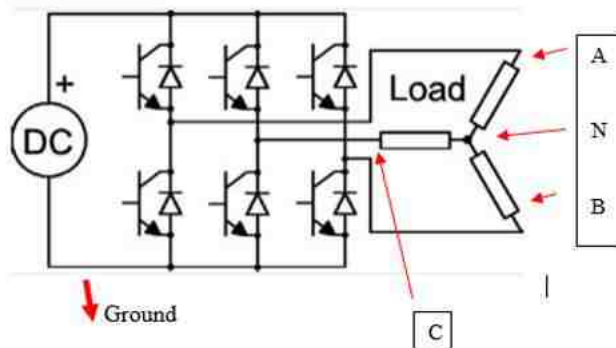
- The low-voltage windings of the MV transformer must be designed for voltages that are capable of a rate of rise in voltage dV/dt of up to $500 \text{ V}/\mu\text{s}$ to ground. The line-to-line voltages are sinusoidal.

Note depending on inverter maker, commutating pulsed voltages can be 1500-2400 volts

2. **Paragraph 5.1.4** Needs to be revised to state that if a neutral is present that it must not be grounded, not just recommended. The reason for this is to prevent the following:

High Frequency Inverter with grounded neutral

B. The inverter circuit.



Here the Load is actually the 3 LV windings

- a. If a Y-connected winding is grounded, then pulsed energy passes only through one winding and goes to ground and does not return through either of the other windings.
- b. If the energy, which comes from a dc source passes through only one winding, the core becomes magnetized and saturates.

- c. The high frequency pulses from the inverter, shown in figure 5 of paragraph 5.1.2 pass into the inverter transformer and draw high LV current due to core saturation, which result in damage or failure of the inverter transformer.
- d. It is not clear whether nameplates need to specify that grounded neutrals are not allowed for inverters, but OK for ac only transformers.
- e. Any testing should result in only power frequencies in the output voltage. This would not be the case when the LV is grounded.

3. Paragraph 5.5.4 Electrostatic shield:

- a. A shield needs to be included surrounding the core and grounded to prevent capacitive coupling of the core by the LV winding with resulting high interlaminar sheet to sheet core voltages that exceed the dielectric strength of the core sheet insulation
- b. A shield between LV and HV is normally included to prevent pulses to enter the HV winding.
- c. Any testing of core ground currents should be void of pulsed currents.

It was noted that on a Delta or Wye connected winding, pulses show up between neutral and ground or between line and ground. Then the high voltage (and pulses) is going to be at the start of the winding and capacitance will be present, which means that pulse energy will be sent to the core. There will be capacitance from the winding to the outside of the core and on either end. But in the middle there would be a ground current that results from capacitance.

Core material isn't able to take voltages between the laminations that are closest to the outside. Core can take 1/10 of a volt between laminations. For example, in a 3,000kVA transformer the volts per turn are equal to the square root of voltage on a single phase = 30-35 volts per turn.

A shield between the ground and the core makes sense for inverter transformers and mitigates the issue.

The current guide should be a standard. Recommendations should become mandates i.e. you may not ground the neutral.

E. Development of PAR: Hemchandra

Hemchandra introduced himself and further explained the issue. Invited others to join him on working on this issue. He plans to initiate the language for the PAR and will put this on the agenda for the subcommittee at the upcoming PCS meeting. He will try to have the PAR ready by the Fall meeting.

There was a suggestion that the scope should include testing as well.

F. Next Steps

- C57.159: Assigned to Performance Characteristics Subcommittee.
- Chair, proposed to be Hemchandra Shertukde.
- Identification of Secretary:

G. Next Meeting Kansas City October 23, 2023

H. Adjournment

Chair: Phil Hopkinson

Secretary: Jonathan Stewart

J.10 Performance Characteristics Subcommittee Attendance List

<u>First Name</u>	<u>Last Name</u>	<u>Affiliation</u>	<u>Status</u>
Kayland	Adams	Prolec-GE	Guest
Alex	Alahmed	Evergy	Guest
Mihir	Amin	EATON	Guest
Tauhid Haque	Ansari	Hitachi Energy	Member
Stephen	Antosz	Stephen Antosz & Associates, Inc	Member
Elise	Arnold	SGB	Guest
Javier	Arteaga	Hitachi Energy	Member
Alex	Ayala	Power Partners	Guest
Donald	Ayers	Ayers Transformer Consulting	Member
Robert	Ballard	DuPont	Member
Gilles	Bargone	FISO Technologies Inc.	Member
Christopher	Baumgartner	We Energies	Member
Barry	Beaster	H-J Family of Companies	Member
Jean-Noel	Berube	Rugged Monitoring Inc.	Guest
Enrique	Betancourt	Prolec GE	Member
Edwin	Betancourt	Siemens-Energy	Guest
Vivek	Bhatt	Prolec-GE	Guest
Daniel	Blaydon	Baltimore Gas & Electric	Member
William	Boettger	Boettger Transformer Consulting LLC	Member
Sanket	Bolar	Oncor Electric Delivery	Member
Susan	Bonfiglio	WAPA	Guest
Michael	Botti	Hyosung HICO	Guest
Jeffrey	Britton	Phenix Technologies, Inc./Doble Eng.	Member
Juan Alfredo	Carrizales	Prolec GE	Guest
Camilo	Casallas	TRENCH	Guest
Arup	Chakraborty	Delta Star Inc.	Guest
Vivian	Chan	Hitachi Energy	Guest
Eunyoung	Cho	HICO-America	Guest
Rhett	Chrysler	ERMCO	Guest
Craig	Colopy	Retired - EATON Corporation	Member-retired
Michael	Craven	Qualus Power Services	Guest
Daniel	Crockett	Ameren	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Guest
Samson	Debass		Guest
J. Arturo	Del Rio	Siemens Energy	Member
Craig	DeRouen	ERMCO	Guest
Scott	Digby	Duke Energy	Guest
Nikolaus	Dillon	Dominion Energy	Guest
Samraghi	Dutta Roy	Siemens Energy	Member

William	Elliott	AEP-SWEP CO	Guest
Evgenii	Ermakov	Hitachi Energy	Guest
Marco	Espindola	Hitachi Energy	Guest
Reto	Fausch	RF Solutions	Member
Marcos	Ferreira	Engineering Consultant Services	Guest
Hugo	Flores	Hitachi Energy	Member
Raymond	Frazier	Ameren	Member
Jose	Gamboa	H-J Family of Companies	Member
Miguel	Garcia	Hitachi Energy	Guest
Eduardo	Garcia Wild	Siemens Energy	Member
Carlos	Gaytan	Prolec GE	Guest
Rob	Ghosh	General Electric	Guest
Ramsis	Girgis	Hitachi Energy	Member
Rafael	Grajeda	EATON	Guest
Bill	Griesacker	Duquesne Light Co.	Member
Ismail	Guner	Hydro-Quebec	Member
Ravi	Gupta	Megger	Guest
Corey	Hanson	Advanced Power Technologies	Guest
Sergio	Hernandez Cano	Hammond Power Solutions	Member
Jean	Hernandez-Myia	Georgia Tech	Guest
John	Herron	Raytech USA	Member
Saramma	Hoffman	PPL Electric Utilities	Member
Ryan	Hogg	Bureau of Reclamation	Guest
Derek	Hollrah	Burns & McDonnell	Guest
Philip	Hopkinson	HVOLT Inc.	Member
Darren	Hoppins	Sensor Link Corp	Guest
Saif	Hossain	Trench Limited	Guest
Nicholas	Jensen	Delta Star Inc.	Guest
John	John	Virginia Transformer Corp.	Member
Akash	Joshi	Mott MacDonald	Member
Jerzy	Kazmierczak		Guest
Sheldon	Kennedy	Niagara Transformer	Member
Christoph	Kerschenbauer	Siemens Energy	Guest
Stacey	Kessler	Ulteig Engineers	Member
Egon	Kirchenmayer	Siemens Energy	Member
Dmitriy	Klempner	Southern California Edison	Guest
Anton	Koshel	Delta Star Inc.	Guest
Jusuf	Krvavac	Sargent & Lundy	Guest
Krzysztof	Kulasek	Delta Star Inc.	Guest
Bernard	LaBean, Jr.	Consumers Energy	Guest
Mark	Lachman	Doble Engineering Co.	Guest

Andrew	Larison		Guest
Moonhee	Lee	Hammond Power Solutions	Member
Weijun	Li	Braintree Electric Light Dept.	Member
Colby	Lovins	Federal Pacific	Guest
Jose Luis	Machain	Prolec GE-Waukesha	Guest
Tim-Felix	Mai	Siemens Energy	Member
Kumar	Mani	Duke Energy	Guest
James	McBride	JMX Services, Inc.	Member
Tim	Menter	Lincoln Electric System	Guest
Kent	Miller	T&R Electric Supply Co., Inc.	Guest
Francis	Mills	Power Engineers	Guest
Juliano	Montanha	Siemens Energy	Guest
Emilio	Morales-Cruz	Qualitrol Company LLC	Member
Hugo	Murillo	H-J Family of Companies	Guest
David	Murray	Tennessee Valley Authority	Member
Ryan	Musgrove	Oklahoma Gas & Electric	Member
Paul	Mushill	Ameren	Guest
Ismael	Naja	EATON	Guest
Aniruddha	Narawane	EATON Corporation	Member
		Electric Power Research Institute (EPRI)	
Poorvi	Patel		Member
Monil	Patel	Pacific Gas & Electric	Guest
Rakesh	Patel	Hitachi Energy	Guest
Harry	Pepe	Phenix Technologies, Inc.	Guest
Sylvain	Plante	Hydro-Quebec	Member
Klaus	Pointner	Trench Austria GmbH	Member
Bertrand	Poulin	Hitachi Energy	Guest
Jarrold	Prince	ERMCO	Member
Ulf	Radbrandt	Hitachi Energy	Member
Ion	Radu	Hitachi Energy	Member
Adnan	Rashid	Measurement Canada / ISED	Guest
Michael	Richardson	Ameren	Guest
Tim	Rocque	Prolec GE Waukesha	Member
Rodrigo	Ronchi	WEG-Voltran	Guest
Marnie	Roussell	Entergy	Member
Hakan	Sahin	Virginia/Georgia Transformer	Guest
Albert	Sanchez	Knoxville Utilities Board	Guest
Alberto	Sandoval Moreno	EATON Corporation	Guest
Dinesh	Sankarakurup	Duke Energy	Guest
Manish	Saraf	Hammond Power Solutions	Guest
Amitabh	Sarkar	Virginia Transformer Corp.	Guest
Daniel	Sauer	EATON Corporation	Member

Markus	Schiessl	SGB	Member
Ewald	Schweiger	Siemens Energy	Guest
Cihangir	Sen	Duke Energy	Guest
Salahuddin	Shaikh	Hitachi Energy	Guest
Abdul Majid	Shaikh	Delta Star, Inc.	Guest
Michael	Sharp	Trench Limited	Guest
Samuel	Sharpless	Rimkus Consulting Group	Member
Hemchandra	Shertukde	University of Hartford	Member
Stephen	Shull	BBC Electrical Services, Inc.	Guest
Christopher	Slattery	FirstEnergy Corp.	Member
Steven	Snyder	Hitachi Energy	Member
Jason	Snyder	First Energy	Guest
Sanjib	Som	Pennsylvania Transformer	Vice-Chair
Mauricio	Soto	Hitachi Energy	Guest
Brad	Staley	Leeward Renewable Energy	Guest
Kyle	Stechschulte	American Electric Power	Member
Andrew	Steineman	Delta Star Inc.	Guest
Charles	Sweetser	OMICRON electronics Corp USA	Member
Ali	Syed	Comed	Guest
Valeriu	Tatu	Powersmiths	Guest
Vijay	Tendulkar	EATON Corporation	Member
Ed	teNyenhuis	Hitachi Energy	Member
Jacob	Thielbar	WAPA	Guest
Scott	Thomas	Hitachi Energy Electrical T&D Apparatus Consultant Inc.	Guest
Subhash	Tuli	Reinhausen Canada Inc.	Guest
Olivier	Uhlmann	ATC	Guest
Cole	Van Dreel	Prolec GE-Waukesha	Guest
Cameron	Vant		Member
Ajith	Varghese		Member
Jason	Varnell	Doble Engineering Co.	Guest
Joshua	Verdell	ERMCO	Member
Dharam	Vir	Prolec-GE	Guest
Richard	vonGemmingen	Dominion Energy	Guest
Pragnesh	Vyas	Sunbelt-Solomon	Member
David	Wallach	Duke Energy	Guest
Alan	Washburn	Burns & McDonnell	Guest
Joe	Watson	JD Watson and Associates Inc.	Member
Bruce	Webb	Knoxville Utilities Board	Member
Drew	Welton	Intellirent	Guest
Joe	White	Power Engineers	Guest
Jeffrey	Wright	Duquesne Light Co.	Member

Fei
Guang
Joshua
Malia
Kris
Waldemar

Yang
Yuan
Yun
Zaman
Zibert
Ziomek

Hitachi ABB Power Grids
Hitachi Energy
Virginia Transformer Corp.
IEEE
Allgeier, Martin and Associates
PTI Transformers

Guest
Guest
Member
Guest
Secretary
Member

Annex K Power Transformers Subcommittee

March 22, 2023

Milwaukee, Wisconsin, USA

Meeting Time: 1:30-2:45 p.m.

Chair: Ryan Musgrove

Vice Chair: Alwyn VanderWalt

Secretary: Weijun Li

K.1 Meeting Attendance

The Power Transformers Subcommittee (PTSC) met on Wednesday, March 22 at 1:30 p.m. The attendance record indicates that 84 out of 107 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 223 individuals attended the meeting; 5 guests requested membership.

PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) and Secretary Weijun Li (Braintree Electric Light Department) were present. Vice Chair Alwyn VanderWalt (Electrical Consultants, Inc.) was not in attendance.

The complete attendance record is provided in Attachment K.1.

K.2 Approval of Agenda and Meeting Minutes

The Chair asked the membership for a motion to approve the agenda. Dan Sauer (Eaton Corporation) made a motion to approve the agenda which was seconded by Ewald Schweiger (Siemens Energy). The agenda was approved without objection. The approved agenda can be found in Attachment K.2.

The Chair asked the membership for a motion to approve the Fall 2022 meeting minutes. Dan Sauer (Eaton Corporation) made a motion to approve the minutes which was seconded by Marcos Ferreira (Bridge View Resources). The minutes were approved without objection.

K.3 Chair's Remarks

The Chair provided an update on PTSC roster. Attendees were reminded to verify their email address and update as necessary. The Chair also announced that guests who wish to become a member of the Power Transformers Subcommittee should see subcommittee officers after the meeting.

The Chair provided an overview of the future scheduled meetings and proposed locations.

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.

The Chair also announced that a new system tracking attendance is expected to be ready for data migration in the 2nd quarter of 2023 and encouraged the membership to join the new system upon receipt of email invitation from Transformers Committee Chair Ed teNyenhuus.

The Chair announced that the working group leadership training through IEEE has been changed to optional, but it is highly recommended that all active members of the standards organization take advantage of this training.

The Chair introduced Patrycja Jarosz, the new IEEE staff contact for PTSC, and provided her contact information. Malia Zaman will continue to be available for assistance during the transition period.

The Chair introduced one new member that was added to the PTSC membership list since the Fall 2022 meeting. The new member is Ryan Hogg with Bureau of Reclamation.

The Chair provided the requirements for establishing & maintaining membership and urged members to participate in all email ballot requests.

K.4 Working Group and Task Force Reports

K.4.1 Revision of C57.131, Standard Requirements for Tap Changers – Craig Colopy

This working group met on Monday and achieved a quorum. The draft document has been adjusted based on MEC (Mandatory Editorial Coordination) review. The working group received copyright approval from IEC on specific text, figures, and tables. Ballot pool was being formed with April 6, 2023 being the deadline.

The complete meeting minutes can be found in Attachment K.4.1. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.2 TF C57.156, Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors – Peter Zhao

This task force met on Monday and achieved a quorum. The task force voted unanimously to seek PTSC's approval to form a working group to revise the document.

Peter Zhao (Hydro One) made a motion to create a PAR to revise C57.156, Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors. Dan Sauer (Eaton Corporation) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.2. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.3 Revision of C57.116, Guide for Transformers Directly Connected to Generators – Weijun Li

This working group has completed its work; therefore, they won't meet again until the next revision cycle, probably in 4-5 years.

K.4.4 PAR Study Group for IEEE 638, Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations – Craig Swinderman

This PAR study group met on Monday and achieved a quorum. The group voted unanimously to seek PTSC's approval to proceed with a PAR for revision of the existing IEEE Std. 638.

Craig Swinderman (Mitsubishi Electric Power Products) made a motion to create a PAR to revise IEEE 638, Standard for Qualification of Class 1E Transformers for Nuclear Power Generating

Stations. Joe Watson (JD Watson and Associates Inc.) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.4. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.5 Revision of C57.135, Guide for the Application, Specification, and Testing of Phase-Shifting Transformers – Ewald Schweiger

This working group met on Monday and achieved a quorum. Richard vonGemmingen (Dominion Energy) was introduced as the new secondary of the working group. IEEE is currently in process of preparing an IEEE/IEC dual logo document of the PC57.135 – Guide for the Application, Specification, and Testing of Phase-Shifting Transformers. Kevin Juchem (ABB AG) is the representative of IEC. IEC needs to appoint technical experts to get process moving on their end. There will be a need for harmonization between IEEE and IEC to review and change the title of the document as Guide is not allowed in IEC documents. A PAR revision will likely be required. Once IEC appoints their technical experts, virtual meetings will be coordinated. This working group is looking for volunteers to review the existing document for improvements.

The complete meeting minutes can be found in Attachment K.4.5. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.6 Revision of C57.143, Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Equipment – Mike Spurlock

This working group met on Monday and achieved a quorum. Working Group Chair Mike Spurlock (Spurlock Engineering Services, LLC) reported that Draft 1.3 was submitted on March 11 for MEC review and ballot invitations were sent out on March 18, 2023. The PAR expires December 31, 2023. A comment resolution group and the possibility of presenting a tutorial after publication were also discussed. A study group will discuss how to best present a tutorial on transformer monitoring.

The complete meeting minutes can be found in Attachment K.4.6. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.7 Revision of C57.125, Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors – Hakan Sahin

This working group met on Monday and achieved a quorum. Several open old business items have been concluded but some remain open. To stay on target of submitting a draft by May of 2024, discussions will continue via virtual meetings and emails before the Fall 2023 meeting. This guide expires on December 31, 2025.

The complete meeting minutes can be found in Attachment K.4.7. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.8 WG C57.170, Guide for the Condition Assessment of Liquid Immersed Transformers, Reactors and Their Components – Kumar Mani

This working group met on Tuesday and achieved a quorum. Presentations were given by Task Forces #1, 2, and 3. The PAR expires on December 31, 2023. The working group voted unanimously to request a 2-year PAR extension to complete the revision of the guide. The group

also carried out additional discussion about a flow chart on how to use the guide. Working Group Chair Kumar Mani (Duke Energy) announced that two more volunteers will help with editing of the document and examining the flow of the guide upon completion of editing. The draft document will be circulated to the working group for a straw ballot before May 15, 2023.

The complete meeting minutes can be found in Attachment K.4.8. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.9 TF C57.157, Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers – Adam Sewell

This task force met on Tuesday and achieved a quorum. The task force voted unanimously to seek PTSC's approval to create a PAR to revise the document.

Adam Sewell (Quality Switch, Inc.) made a motion to create a PAR to revise C57.157, Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers. Dan Sauer (Eaton Corporation) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.9. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.10 Revision of C57.150, Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Higher – Greg Anderson

This working group met on Tuesday. A quorum was not achieved. Invitation was sent on March 8, 2023 to form a ballot group. SA ballot process is expected to begin early April (targeting April 9). The goal is to submit final document to RevCom by October 16, 2023.

The complete meeting minutes can be found in Attachment K.4.10. This working group doesn't plan to meet in Kansas City.

K.4.11 TF PC57.17, Standard Requirements for Arc Furnace Transformers – Dom Corsi

This group met on Tuesday as a task force as PAR was not yet approved. Out of the 31 active participants, 14 requested membership and will become members. The TF chair Dom Corsi (Doble Engineering Company) requested volunteers to help updating the standard on a clause-by-clause basis.

The complete meeting minutes can be found in Attachment K.4.11. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.12 WG C57.107, Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly Connected to Generators – Joe Watson

The focus of the meeting was final resolution of the editorial and technical comments on the straw ballot for Draft 2 of the document. A summary of the comments was prepared by Drew Welton (Intellirent) and presented by the working group chair Joe Watson (JD Watson and Associates Inc.). The working group voted unanimously to request approval from PTSC to move the document, with noted editorial changes, to IEEE SA for MEC review and balloting.

Joe Watson (JD Watson and Associates Inc.) made a motion to move Draft 3 of C57.107, Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for

Transformers Directly Connected to Generators to ballot. Bruce Webb (Knoxville Utilities Board) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.12. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.13 TF C57.93, IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Scott Reed

This task force met on Tuesday and achieved a quorum. An LTC Maintenance presentation was given to help the group consider whether to develop as part of the revised guide. The task force began discussions of what this guide should include so a title, scope, and purpose can be developed.

The complete meeting minutes can be found in Attachment K.4.13. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.4.14 Liaison to PC57.93a Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – Scott Reed

This is liaison activity related to the topic of low temperature cold starts for transformers with natural ester fluid. The Chinese task force studying cold start up for natural esters performed testing at -15°C, -25°C, and -35°C, and monitored the winding and fluid temperatures as the load increased. Preliminary conclusions were 2 additional hours of no load for every 10°C drop in temperature. No work has been done since Fall 2022 but more detailed update is expected to be provided on testing at the next meeting. Scott Reed (MVA) raised concerns about language barriers when interacting with the Chinese task force. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) noted the concerns and will follow up with Patrycja Jarosz and Malia Zaman of IEEE SA.

There were no meeting minutes for this liaison activity.

K.4.15 TF C57.153, Guide for Paralleling Regulating Transformers – Mark Tostrud

This task force met on Tuesday and achieved a quorum. The group reviewed the results of the straw ballot that closed on March 13, 2023, and recommended the guide be updated to provide recommendations for reverse power flow conditions. No changes to the existing title, scope, and purpose of the guide were identified.

Mark Tostrud (Dynamic Ratings, Inc.) made a motion to create a PAR to revise C57.153, Guide for Paralleling Regulating Transformers. Dan Sauer (Eaton Corporation) seconded the motion. The motion passed with unanimous approval.

The complete meeting minutes can be found in Attachment K.4.15. The next in-person meeting is planned for Fall 2023 in Kansas City.

K.5 Old Business

Transformer Seismic Concerns

Fabian Stacy (Hitachi Energy) pointed out that IEEE Draft Recommended Practice for Seismic Design of Substations Amendment is currently in balloting process. The next IEEE PES Substations Committee meeting is scheduled for May 1-5, 2023 in Philadelphia, Pennsylvania.

The changes are significant and appear to be driven by consultants. The contents of “amendment” represent drastic changes to the document. There is a need for others including the Transformers Committee to weigh in. Joe Watson (JD Watson and Associates Inc.) mentioned that he submitted a comment voicing concerns about the major changes but has not heard back. The working group (WGD4 – Seismic Design of Substations) chair is Michael Riley. Jason Varnell (Doble Engineering Co.) said that a technical presentation on the proposed amendment was given by Michael Riley and Jon Bender at the Fall 2021 Transformers Committee virtual meeting. The general observation was that the Transformers Committee should voice concerns about the proposed major changes as they would affect power transformer designs. PTSC Chair Ryan Musgrove (Oklahoma Gas & Electric) noted the concerns and will follow up with Patrycja Jarosz and Malia Zaman of IEEE SA on how to proceed.

Entity PAR “Recommended Practice on Digital Twin Modeling and Analysis based on Spatial-temporal Data of Switch Cabinet and Transformer with 110kV and Below” – Brian Sparling

The PAR wording is in revision and will have more updates to provide at the next meeting. Like the liaison to Entity PAR PC57.93a, concerns have also been made on translation issues during meetings on this particular entity PAR.

K.6 New Business

Entity PAR Request “Guide for Power Transformers for Low-frequency (20Hz) Power Transmission”

The Chair displayed the slide deck titled “IEEE PAR - Guide for Power Transforms for Low-Frequency (20Hz) Power Transmission” by State Grid Zhejiang Electric Power Co., Ltd. Research Institute” that was sent to him through Transformers Committee Standards Coordinator Stephen Shull via an email dated February 3, 2022. The slides covered the background, requirement analysis, existing standards, scope, framework, and information about the working group based in China. The proposed scope states, “This guide provides technical guidance for the design and application of power transformers for low-frequency (20Hz) power transmission. It includes general requirements, design concepts, electrical, physical and mechanical characteristics, as well as test items and methods of low-frequency power transformers.”

Dan Sauer (Eaton Corporation) asked if IEEE has any existing documents that address all or part of the proposed scope. Sheldon Kennedy (Niagara Transformer) mentioned that Niagara Transformer recently manufactured some 25 Hz power transformers but there are no standards that can be referred to. Joe Watson (JD Watson and Associates Inc.) said that if PTSC approves this entity PAR, PTSC will have a representative, but the document will only be voted on by the listed entities.

Ewald Schweiger (Siemens Energy) commented that an entity PAR request like this should send a representative to present their materials as these are complex topics and such requests seem to be on the rise.

Stephen Shull (BBC Electrical Services, Inc.) made a motion for the PTSC to accept this entity PAR request. Joe Watson (JD Watson and Associates Inc.) seconded the motion. The motion passed with unanimous approval.

While there are concerns that this entity PAR will cover more than just the PTSC documents, PTSC is the appropriate subcommittee to lead the efforts. Anyone who is interested in being the entity PAR liaison is encouraged to contact the PTSC Chair at ryan.musgrove@ieee.org.

Other New Business

New business requesting a task force for creation of a new IOT document was brought up by Sanjib Som (Pennsylvania Transformer) but there was not enough time to fully discuss. Dan Sauer (Eaton Corporation) made a motion to have this topic tabled and discussed at the next PTSC meeting. Kumar Mani (Duke Energy) seconded the motion. The motion passed with unanimous approval.

K.7 Adjournment

The meeting adjourned at 2:45 p.m.

K.8 Attachments

Attachment K.1 – Attendance

Attachment K.2 – F22 PTSC Agenda

Attachment K 4.1 – C57.131 Minutes

Attachment K 4.2 – C57.156 Minutes

Attachment K 4.3 – C57.116 (No Meeting)

Attachment K 4.4 – IEEE 638 Minutes

Attachment K 4.5 – C57.135 Minutes

Attachment K 4.6 – C57.143 Minutes

Attachment K 4.7 – C57.125 Minutes

Attachment K 4.8 – C57.170 Minutes

Attachment K 4.9 – C57.157 Minutes

Attachment K 4.10 – C57.150 Minutes

Attachment K 4.11 – C57.17 Minutes

Attachment K 4.12 – C57.107 Minutes

Attachment K 4.13 – C57.93 Minutes

Attachment K 4.14 – Liaison to PC57.93a (No Meeting Minutes)

Attachment K 4.15 – C57.153 Minutes

Attachment K.1

<u>Role</u>	<u>First Name</u>	<u>Last Name</u>	<u>Company / Affiliation</u>
Member	Kayland	Adams	Prolec GE Waukesha
Guest	Alex	Alahmed	Evergy Wolf Creek
Guest	Rehan	Ali	Siemens Energy
Member	Tauhid Haque	Ansari	Hitachi Energy
Guest	Gregory	Ante	Southern California Edison
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Elise	Arnold	SGB
Member	Javier	Arteaga	Hitachi Energy
Member	Donald	Ayers	Ayers Transformer Consulting
Member	Gilles	Bargone	FISO Technologies Inc.
Member	Christopher	Baumgartner	We Energies
Guest	Barry	Beaster	H-J Family of Companies
Guest	Jason	Beaudoin	Weidmann Electrical Technology
Guest	Jean-Noel	Berube	Rugged Monitoring Inc.
Member	Enrique	Betancourt	Prolec GE
Guest	Vivek	Bhatt	Prolec GE
Member	Wallace	Binder	WBBinder Consultant
Guest	Piotr	Blaszczyk	Specialty Transformer Components LLC
Member	Daniel	Blaydon	Baltimore Gas & Electric
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	Sanket	Bolar	Oncor Electric Delivery
Member	Paul	Boman	Hartford Steam Boiler
Guest	Susan	Bonfiglio	Western Area Power Admin.
Guest	Michael	Botti	Hyosung HICO
Guest	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	Jeffrey	Britton	Doble Engineering Co.
Guest	Samuel	Brodeur	Hitachi ABB Power Grids
Member	David	Calitz	Siemens Energy
Guest	Juan Alfredo	Carrizales	Prolec GE
Guest	Arup	Chakraborty	Delta Star Inc.
Member	Stuart	Chambers	Powertech Labs Inc.
Guest	Vivian	Chan	Hitachi Energy
Guest	Raymundo	Chapa	WEG Transformers USA Inc.
Guest	Jonathan	Cheatham	General Electric
Guest	Anthony	Coker	M&I Materials Inc.
Member	Craig	Colopy	Retired
Guest	Michael	Craven	Qualus Corp.
Guest	Daniel	Crockett	Ameren

Member	Juan Carlos	Cruz Valdes	Prolec GE
Guest	Roberto	Da Silva	Cargill, Inc.
Member	Eric	Davis	Burns & McDonnell
Guest	Samson	Debass	EPRI
Member	Scott	Digby	Duke Energy
Guest	Nikolaus	Dillon	Dominion Energy
Guest	Zachary	Draper	Delta-X Research Inc.
Guest	Jesse	Duffy	Nashville Electric Service
Guest	Roger	Dugan	EPRI
Member	Hakim	Dulac	Advanced Power Technologies
Member	Samragani	Dutta Roy	Siemens Energy
Guest	William	Elliott	AEP-SWEPCO
Member	Evgenii	Ermakov	Hitachi Energy
Guest	Marco	Espindola	Hitachi Energy
Member	Reto	Fausch	RF Solutions
Member	Marcos	Ferreira	Bridge View Resources
Member	Hugo	Flores	Hitachi Energy
Guest	Marc	Foata	Maschinenfabrik Reinhausen
Guest	Raymond	Frazier	Ameren
Guest	Jose	Gamboa	H-J Family of Companies
Member	Eduardo	Garcia Wild	Siemens Energy
Guest	James	Gardner	Prolec GE Waukesha
Guest	Rob	Ghosh	General Electric
Member	Ramsis	Girgis	Hitachi Energy
Guest	Jose Antonio	Gonzalez Ceballos	Georgia Transformer
Guest	Alireza	Gorzin	Black & Veatch
Member	Bill	Griesacker	William Griesacker and Associates
Guest	Brad	Grooms	NTS
Member	Ismail	Guner	Hydro-Quebec
Guest	Ravi	Gupta	Megger
Member	Niklas	Gustavsson	Hitachi Energy
Member	Attila	Gyore	M&I Materials Ltd
Guest	Corey	Hanson	Advanced Power Technologies
Member	Roger	Hayes	General Electric
Member	Kyle	Heiden	EATON Corporation
Guest	Ronald	Hernandez	Doble Engineering Co.
Member	John	Herron	Raytech USA
Member	Saramma	Hoffman	PPL Electric Utilities
Member	Ryan	Hogg	Bureau of Reclamation
Guest	Derek	Hollrah	Burns & McDonnell

Member	Philip	Hopkinson	HVOLT Inc.
Guest	Darren	Hoppins	Sensorlink Corp.
Guest	Nicholas	Jensen	Delta Star Inc.
Member	John	John	Virginia Transformer Corp.
Guest	Christopher	Johnson	Oncor Electric Delivery
Member	Akash	Joshi	Mott MacDonald
Member	Kurt	Kaineder	Siemens Energy
Guest	Jerzy	Kazmierczak	Hitachi Energy
Member	Sheldon	Kennedy	Niagara Transformer
Guest	Christoph	Kerschenbauer	Siemens Energy
Guest	Stacey	Kessler	Ulteig
Guest	Qasim	Khan	Neetrac Georgia Tech
Member	Zan	Kiparizoski	Howard Industries
Member	Egon	Kirchenmayer	Siemens Energy
Member	Dmitriy	Klempner	Southern California Edison
Guest	Anton	Koshel	Delta Star Inc.
Guest	Rafal	Kowalski	Hitachi Energy
Guest	Jusuf	Krvavac	Sargent & Lundy
Guest	Krzysztof	Kulasek	Delta Star Inc.
Guest	Bernard	Labean Jr.	Consumers Energy
Guest	Mark	Lachman	Doble Engineering Co.
Secretary	Weijun	Li	Braintree Electric Light Dept.
Guest	Tiffany	Lucas, P.E.	SPX Transformer Solutions, Inc.
Guest	Stephanie	Mabrey	Weidmann Electrical Technology
Guest	Jose	Machain	Prolec GE
Guest	Jinesh	Malde	M&I Materials Inc.
Guest	Gabriel	Mamede	Siemens Energy
Member	Kumar	Mani	Duke Energy
Guest	Robert	Mayer	Siemens Energy
Guest	Kevin	Mazzei	Black & Veatch
Guest	James	McBride	JMX Services, Inc.
Guest	Toni	Mellin	Vaisala
Guest	Kent	Miller	Retired
Guest	Francis	Mills	Power Engineers, Inc.
Guest	Justin	Minikel	EATON Corporation
Guest	Marian	Mohamed	Xcel Energy
Guest	Juliano	Montanha	Siemens Energy
Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Guest	Hugo	Murillo	H-J Family of Companies
Member	David	Murray	Tennessee Valley Authority
Chair	Ryan	Musgrove	Oklahoma Gas & Electric

Guest	Paul	Mushill	Ameren
Guest	Ismael	Naja	EATON Corporation
Guest	Mark	Newbill	Hitachi Energy
Member	Anastasia	O'Malley	Consolidated Edison Co. of NY
Guest	Eduardo	Orozco	GE Grid Solutions
Guest	Dwight	Parkinson	EATON Corporation
Member	Poorvi	Patel	Electric Power Research Institute (EPRI)
Guest	Monil	Patel	Pacific Gas & Electric
Guest	Rakesh	Patel	Hitachi Energy
Guest	Verena	Pellon	Florida Power & Light
Guest	Harry	Pepe	Phenix Technologies, Inc.
Guest	Miguel	Plascencia	PG&E
Guest	Homero	Portillo	Advanced Power Technologies
Guest	Daniel	Posadas	Prolec SA DECV
Guest	Bertrand	Poulin	Hitachi Energy
Member	Ion	Radu	Hitachi Energy
Member	Scott	Reed	MVA
Guest	Sebastian	Rehkopf	Maschinenfabrik Reinhausen
Guest	Clemens	Reiss IV	Custom Materials, Inc.
Guest	Michael	Richardson	Ameren
Guest	Kevin	Riordan	WEG Transformers USA Inc.
Guest	Diego	Robalino	Megger
Guest	Patrick	Rock	American Transmission Co.
Guest	Tim	Rocque	Prolec GE Waukesha
Guest	Rodrigo	Ronchi	WEG-Voltran
Guest	Yuri	Rossini	Siemens Energy
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Member	Daniel	Sauer	EATON Corporation
Member	Alan	Sbravati	Hitachi Energy
Guest	Alaor	Scardazzi	Siemens Energy
Guest	Stefan	Schindler	Maschinenfabrik Reinhausen
Member	Dan	Schwartz	Quality Switch, Inc.
Member	Ewald	Schweiger	Siemens Energy
Member	Cihangir	Sen	Duke Energy
Member	Adam	Sewell	Quality Switch, Inc.

Guest	Jeremy	Sewell	Quality Switch, Inc.
Guest	Russell	Sewell	Quality Switch, Inc.
Guest	Abdul Majid	Shaikh	Delta Star Inc.
Guest	Salahuddin	Shaikh	Hitachi Energy
Guest	Hemchandra	Shertukde	University of Hartford
Member	Stephen	Shull	BBC Electrical Services, Inc.
Guest	Andre	Simons	Cogent Power Inc.
Guest	Jonathan	Sinclair	PPL Electric Utilities
Guest	Christopher	Slattery	FirstEnergy Corp.
Guest	Jason	Snyder	FirstEnergy Corp.
Guest	Muhammad Abdullah	Sohail	Trench
Member	William	Solano	Reinhausen Manufacturing Inc.
Member	Sanjib	Som	Pennsylvania Transformer
Guest	Mauricio	Soto	Hitachi Energy
Guest	Brian	Sparling	Dynamic Ratings, Inc.
Member	Mike	Spurlock	Spurlock Engineering Services, LLC
Member	Fabian	Stacy	Hitachi Energy
Member	Brad	Staley	Leeward Energy
Member	Markus	Stank	Maschinenfabrik Reinhausen
Member	Kyle	Stechschulte	American Electric Power
Guest	Ethan	Steiger	Qualitrol
Guest	Andrew	Steineman	Delta Star Inc.
Guest	Christopher	Steineman	Delta Star Inc.
Guest	Charles	Sweetser	OMICRON electronics Corp USA
Guest	Craig	Swinderman	Mitsubishi Electric Power Products
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Member	Troy	Tanaka	Burns & McDonnell
Guest	Marc	Taylor	JFE Shoji Power Canada Inc.
Guest	Ed	teNyenhuis	Hitachi Energy
Guest	Jacob	Thielbar	WAPA
Guest	Scott	Thomas	Hitachi Energy
Guest	Timothy	Tillery	Howard Industries
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Guest	Risto	Trifunoski	Trench
Guest	Subhash	Tuli	Electrical T&D Apparatus Consultant Inc.
Guest	Olivier	Uhlmann	Reinhausen Canada Inc.
Guest	Cole	Van Dreel	American Transmission Co.
Guest	Cameron	Vant	Prolec-Waukesha
Member	Ajith	Varghese	Prolec Energy
Member	Jason	Varnell	Doble Engineering Co.

Guest	Karsten	Viereck	Maschinenfabrik Reinhausen
Guest	Dharam	Vir	Prolec GE
Guest	Duy	Vo	Central Maine Power (AVANGRID)
Guest	Richard	vonGemmingen	Dominion Energy
Member	Pragnesh	Vyas	Sunbelt-Solomon Solutions
Member	David	Wallach	Duke Energy
Member	Joe	Watson	JD Watson and Associates Inc.
Guest	Matthew	Webb	SPX Transformer Solutions, Inc.
Guest	Drew	Welton	Intellirent
Member	Daniel	Weyer	Monolith
Guest	Joe	White	Power Engineers
Member	William	Whitehead	H2scan Corporation
Guest	Christopher	Whitten	Hitachi Energy
Guest	Trenton	Williams	Advanced Power Technologies
Guest	Deanna	Woods	Alliant Energy
Member	Jeffrey	Wright	Duquesne Light Co.
Guest	Fei	Yang	Hitachi Energy
Guest	Kwasi	Yeboah	GE Energy Management
Guest	Joshua	Yun	Virginia Transformer Corp.
Guest	Gigi	Zhang	HICO America
Member	Peter	Zhao	Hydro One
Member	Kris	Zibert	Allgeier, Martin and Associates
Member	Waldemar	Ziomek	PTI Transformers

AGENDA

Power Transformers Subcommittee

IEEE PES Transformers Committee

Wednesday, March 22nd, 2023, 1:30-2:45 PM CST, Regency AB(2)

In Person – Welcome All

Ryan Musgrove – Chair, Alwyn VanderWalt – Vice Chair, Weijun Li – Secretary

1. Call to order
2. Distribution of Roster
3. Chair remarks
4. New Members
5. Determine quorum
6. Approval of agenda, approval of previous meeting minutes
7. Working Group and Task Force reports
 - a. WG Revision of C57.131, Tap Changers..... Craig Colopy
 - i. Monday Mar 20th, 9:30-10:45 – Milwaukee (2)
 - b. TF C57.156, Guide for Tank Rupture Mitigation..... Peter Zhao
 - i. Monday Mar 20th, 9:30-10:45 – Regency A (2)
 - c. WG Revision of C57.116, GSU Transformers (Completed 2022 – no meeting)..... Weijun Li
 - d. WG Class 1E Transformer for Nuclear Power gen Std. 638 Craig Swinderman
 - i. Monday Mar 20th, 11:00-12:15 – Regency A(2)
 - e. WG C57.135, Guide for Phase shifting Transformers.....Ewald Schweiger
 - i. Monday Mar 20th, 1:45-3:00 – Regency A(2)
 - f. WG Revision of C57.143, Monitoring Guide Mike Spurlock
 - i. Monday Mar 20th, 3:15-4:30 – Lakeshore Ballroom (1)
 - g. WG Revision of C57.125, Failure Investigating and Reporting Hakan Sahin
 - i. Monday Mar 20th, 4:45-6:00 – Regency B(2)
 - h. WG C57.170, Condition Assessment Guide Kumar Mani
 - i. Tuesday Mar 21st, 8:00-9:15 – Lakeshore Ballroom (1)
 - i. TF C57.157, Guide for Life test of Switch Contacts..... Adam Sewell
 - i. Tuesday Mar 21st, 8:00-9:15 – Gilpatrick (1)
 - j. WG Revision of C57.150, Transportation Guide Greg Anderson
 - i. Tuesday Mar 21st, 9:30-10:45 – Executive Ballroom (1)
 - k. TF C57.17, Standard Requirements for Arc Furnace Transformers.....Dom Corsi
 - i. Tuesday Mar 21st, 11:00-12:15 – Regency B (2)
 - l. WG C57.107, Transformer Volts per Hertz Joe Watson
 - i. Tuesday Mar 21st, 1:45-3:00 – Regency B (2)
 - m. TF C57.93, Installation and Maintenance Guide..... Scott Reed
 - i. Tuesday Mar 21st, 3:15-4:30 – Lakeshore Ballroom (1)
 - n. Liaison to PC57.93a – Installation and Maintenance Guide Scott Reed
 - o. TF C57.153, Guide for Paralleling Transformers Mark Tostrud
 - i. Tuesday Mar 21st, 4:45-6:00 – Regency B (2)
8. Old business

- a. Transformer Seismic Concerns
 - b. Entity PAR “Recommended Practice on Digital Twin Modeling and Analysis based on Spatial-temporal Data of Switch Cabinet and Transformer with 110kV and Below” – Brian Sparling
- 9. New business
 - a. Entity PAR Request “Guide for Power Transformers for Low-frequency (20Hz) Power Transmission”
- 10. Adjournment

Power Transformers Subcommittee Working Group Report

Document #:	<u>C57.131</u>	
Document Title:	<u>Standard Performance Requirements and Test Methods for Tap-changers</u>	
Chair:	<u>Craig A. Colopy</u>	Vice-Chair <u>Axel Kraemer</u>
Secretary	<u>Adam M. Sewell</u>	Percent Complete <u>99%</u>
Current Draft Being Worked On:	<u>1.2</u>	Dated: <u>March 2023</u>
PAR Expiration Date:	<u>December 31, 2024</u>	
Meeting Date:	<u>20 March 2023</u>	Time: <u>9:30am-10:45am</u>
Location:	<u>Milwaukee, WI, USA</u>	

Attendance: Members	<u>24 out of 41</u>
Guests	<u>35</u>
Guests Requesting Membership	<u>6</u>
Total*	<u>59</u>

* Attendance list for this meeting is shown at end of meeting minutes

Meeting Minutes / Significant Issues / Comments:

1. Meeting was called to order at 9:30am, March 20, 2023 at Hyatt Regency Hotel, Room-Milwaukee.
2. Distribution of attendance sheets
 - a. If you didn't receive an email from this working group before this meeting or are not on the attendance sheet, please send an email to adamsewell@ieee.org with the subject: C57.131 EMAIL to be added to the C57.131 WG email list
3. Quorum Check / Introductions
 - a. Introductions were made by name and affiliation
 - b. 24 members out of 41 were in attendance – QUORUM MET
 - c. Member requests can be sent to ADAMSEWELL@IEEE.ORG
4. Approval of 2023 Spring Agenda and Approval of minutes from Fall 2022 Charlotte Meeting
 - a. Motion – M.Ferreira, 2nd-H.Flores
 - b. No opposition to unanimous approval. APPROVED
5. OLD BUSINESS

- a. Fall 2022 meeting discussion from S. Patel (WG Guest) about reactor type vs reactance type and resistor type vs resistance type wording change that was done on previous draft.
 - i. Fall 2022 meeting had discussion with S. Patel (WG Guest) regarding use of wording “reactor type” in lieu of “reactance type” and “resistor type” in lieu of “resistance type” found in the IEC standard 60214-1 ED2.0
 - ii. Chair agreed to consider changing wording to “reactance type” and “resistance type” found in C57.131 -2012. No MOTION was made to vote on this change to the document, so Draft 1.2 wording was not changed. Draft 1.1 also had this wording also which had been finalized at work session on 3/26/22. The scope has this wording as well. A change would have required a revision to the PAR.
- b. Kept the following notes for a future joint(dual logo) revision of IEC 60214-1
 - i. Section 6.1.15 Protection against access to hazardous parts - check if there is an equivalent designation in NEMA 250 for IP1X
 - 1. Based on investigation Chair found no identical designation in Nema 250.
 - ii. Section 7.2.2 Temperature rise. Some discussion is warranted regarding the difference between maximum contact temperatures of OLTC and DETC along with defining contact test temperature methodology to normalize testing. This could include switch orientation, liquid volume and parameters you have to prevent unwarranted advantageous results.
 - iii. Table 3 values for switching impulse test values
 - 1. Current IEEE and IEC standards do not list switching impulse values less than 100kV. Switching impulse values will be looked at for less than 100kV. 69kV was a value brought up in the 3/28/22 meeting.

6. NEW BUSINESS

- a. Ballot of Draft 1.2 of C57.131 dated March 2023. Draft is posted on PTSC site.
 - i. Ballot invitation is open until April 6, 2023
 - ii. Ballot can be joined on IEEE MyProject – sign in with IEEE signon info: (<https://development.standards.ieee.org/my-site>)
 - iii. After signing in to myProject, go to Menu->Invitations/Ballots then click on the Open Invitations tab. Then click on All Invitations beside the Show: and you should find the PC57.131 available to join.
 - iv. Email secretary (adamsewell@ieee.org) with questions/problems joining the ballot group
- 7. Next meeting: October 23, 2023 at Fall 2023 Transformers Committee Meeting scheduled for October 22-26, 2023, Kansas City, MO, USA.
- 8. Close of meeting – 9:47am
 - a. Motion – T.Dauzat, 2nd – M. Ferreira. No opposition to unanimous approval. ADJOURNED

Submitted by: Craig A. Colopy

Date: 3/25/2023

Meeting Attendance 3/20/2023 (RM1 = Request Membership 1st time):

Last Name	First Name	Company (Affiliation)	Role
Arora	Kush	Maschinenfabrik Reinhausen	Guest
Beaster	Barry	H-J Family of Companies	Guest
Blaszczyk	Piotr	Specialty Transformer Components LLC	Member
Boettger	William	Boettger Transformer Consulting LLC	Guest
Bolar	Sanket	Oncor	Guest
Borck	Christopher	Eaton	Guest
Castro	Fidel	SDGE	Guest
Colopy	Craig	Consultant	Chair
Cruz Valdes	Juan Carlos	Prolec GE	Member
Dauzat	Thomas	AEP	Member
Dillon	Nikolaus	Dominion Energy	Guest
Dutta Roy	Samraghi	Siemens Energy	Guest-RM1
Faur	Florin	Prolec GE Waukesha	Member
Ferreira	Marcos	Bridge View Resources	Member
Flores	Hugo	Hitachi Energy	Member
Gardner	James	Prolec GE Waukesha	Guest-RM1
Garza	Hector	Orto de Mexico	Guest
Gorzin	Allis	Black & Veatch	Guest
Gragert	Jeffrey	Xcel Energy	Guest
Gross	Detlev	Power Diag. Consult	Guest
Gupta	Ravi	Megger	Guest
Gustavsson	Niklas	Hitachi Energy	Member
Gyore	Attila	M&I Materials Ltd	Member
Kessler	Stacey	Ulteig Engineers	Guest-RM1
Lejay	Olivier	Huaming USA Corp.	Member
Mazzei	Kevin	Black & Veatch	Guest
Mills	Francis	Power Engineers	Guest
Mohamed	Marian	Xcel Energy	Guest
Munoz Molina	Martin	Orto de Mexico	Member
Mushili	Kevin	Ameren	Guest

Last Name	First Name	Company (Affiliation)	Role
Newbill	Mark	Hitachi Energy	Guest
Pruente	John	Prolec GE Waukesha	Member
Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Member
Reiss	Tony	CMI	Guest
Rock	Patrick	American Transmission Company	Guest
Sarkar	Amitabh	Virginia Transformer Corp	Guest-RM1
Saudsten	Lina	Hitachi Energy	Guest-RM1
Schindler	Stefan	Maschinenfabrik Reinhausen	Member
Schleismann	Eric	Southern Company Services	Member
Schwartz	Dan	Quality Switch, Inc.	Member
Sewell	Adam	Quality Switch, Inc.	Secretary
Sewell	Jeremy	Quality Switch, Inc.	Member
Sewell	Russ	Quality Switch, Inc.	Guest
Solano	William	Maschinenfabrik Reinhausen	Guest-RM1
Som	Sanjib	Pennsylvania Transformer	Member
Stacey	Brad	Leeward Renewable Energy	Guest
Stank	Markus	Maschinenfabrik Reinhausen	Member
Stechschulte	Kyle	American Electric Power	Member
Szczecowski	Janusz	Maschinenfabrik Reinhausen	Guest
Tanaka	Troy	Burns & McDonnell	Guest
Tekle	Samuel	WEG TX USA	Guest
Thomas	Scott	Hitachi Energy	Guest
Tillery	Timothy	Howard Industries	Member
Uhlmann	Olivier	Reinhausen Canada	Guest
Viereck	Karsten	Maschinenfabrik Reinhausen	Guest
Waldrop	Mike	Memphis Light, Gas & Water	Member
Whitten	Christopher	Hitachi Energy	Member
Yang	Fei	Hitachi Energy	Guest
Zanwar	Anand	Siemens Energy	Guest

Title: TF Guide for Tank Rupture Mitigation C57.156

Time: 9:15 AM- 10:45 AM, Monday, March 20, 2023

Place: Hyatt Regency Milwaukee, WI

Meeting Minutes:

At 9:15 AM, Chair called the meeting to order.

Chair welcome the members and guests, followed with introductions.

This is the 2nd TF meeting. There were 68 participants, among which, 19 requested for membership. A quorum was reached.

Meeting minutes from Charlotte meeting was unanimously approved.

Chair briefed about the scope of the work for this TF, and progress made as to date.

Samuel Brodeur from Hitachi Energy provided a presentation: Oil Leak Risk Mitigation of Components.

Open floor discussions were carried out in completion of the new PAR as described below:

The TF completed the PAR study, followed with a motion made by Joe Watson, and seconded by Eduardo Garcia/Hakim Dulac, and voted unanimously to take the new PAR to the PTSC and request to form a working group to revise the document.

Meeting adjourned at 10:45AM.

Reported by:

Peter Zhao, P.Eng.

Chair of the TF

New PAR:

Title:

IEEE Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors

Scope

This guide describes measures that may be taken to help mitigate rupture and uncontrolled insulating liquid release from energized liquid-immersed power transformers' and reactors' tanks and components due to internal electrical faults.

Purpose

This guide describes the current state of knowledge of the relationship between tank rupture and such variables as arc energy level, hydraulic pressures, and tank pressure withstand. Also described are various measures that transformer users and manufacturers may take in system design, product design, monitoring devices, signaling devices, and insulating fluid choices that can help mitigate tank rupture.

Attendance List - Milwaukee Meeting - March 20, 2023		
Name	Affiliation	Membership requested (yes or no)
Alfons Schrammel	Siemens Energy	yes
Anastasia O'Malley	Con Edison NY	yes
Andy Steiuemau	Delta Star	no
Attila Gyore	M&I Materials	yes (S23)
Christoph Kerschenbauer	SE Transformers	no
Christopher Johnson	Oncor	no
Eduardo Garcia	Siemens Energy	yes
Emilio Norales-Cruz	Qualitro	yes
Ewald Schweiger	Siemens Energy	yes
Goran Plisic	Siemens Energy, KPT	no
Hakim Dulac	APT	yes (S23)
Jason Snyder	First Energy	no
Jeremiah Bradshaw	Bureau of Reclamation	yes
Joe Nims	Allen& Hoshall	no
Joe Watson	JDWatson & Associates	yes
Jose Luis Machain	Prolec GE	no
Joshua Yun	Virginia Transformer	yes
Juan Alfredo Carrizales	Prolec GE	no
Marc Foata	MR	yes
Michael Botti	Hyosung HICO	yes (S23)
Omar Mendez Zomors	Prolec	no
Peter Zhao	Hydro One	yes
Jerzy Kazmierczak	Hitachi Energy	yes (S23)
Junho Lee	Hyundai Electric	no
Soyoung Lee	Hyundai Electric	no
Zan Kiparizoski	Howard Industries	yes (S23)
Nick Walder	Eaton Corp.	no
Edwin Betancourt	Siemens Energy	no
Rodrigo Ronchi	WEG Transformers	no
Arup Chakraborty	Delta Star Inc	yes (S23)
Nick Jensen	Delta Star Inc	no
Krzysztof Kulasek	Delta Star Inc	yes (S23)
David Murray	TVA	yes (S23)
Andy Speegle	ENTERGY	NO
Chris Steineman	Delta Star Inc	no
Dipak Patel	ITEC	no
David Ward	ITEC	no
David Calitt	Siemens Energy	yes (S23)
Vivian Chan	Hitachi Energy	no
Rob Ghosh	GE	yes (S23)
Daniel Crocket	Ameren	no
Bill Griesacker	WGA	no
Robert mayer	Siemens Energy	yes (S23)
William Boettger	Boettger Transformer Consulting	yes (S23)
Eun young Cho	Hi-Co America	no
Risto Trifunoski	Trench Canada	yes (S23)
Rehan Ali	Siemens Enegry	no
Derek Hollrah	Burns&McDonnoll	no
Kevin juclem	Hitachi Energy	no
Samuel Brodeur	Hitachi Energy	yes (S23)
Sanjay Patel	Royal Smit	no
Tim Rocque	Prolec GE Waukesha	no
Marta Munoz	Hitachi Energy	no
Robert Middleton	RHM International	no
Cody Vanwyck	Commonwealth associates	yes (S23)
jos veens	smith transformers	no
Liolija Iuanic	siemens energy-KPT	no
Igor Persinec	siemens energy-KPT	no
Eric Schleismann	Southern Company	no
Samson Debass	EPRI	no
Corey Hanson	Advanced Power Technologies	no
Homer Portillo	Advanced Power Technologies	no
Stephen Antosz	Consultant	no
Muhammad Sohail	Trench Canada	yes (S23)
Jason Beaudin	Weidmann	no
Alahmed Alex	Energy	yes (S23)
Akash Joshi	Mott MacDonald	yes (S23)
Carlos H Alonso	Arteche	yes (S23)

PAR Study Group for revision of IEEE 638-2013 “Qualification of Class 1E Transformers for Nuclear Power Generating Stations”

MEETING MINUTES

Date: Monday, March 20 – 11:00 am to 12:15 pm.

The meeting was called to order at 11:00 am by Chair Craig Swinderman.

There were a total of 14 people present, 6 members and 8 guests. Attendance was taken with a paper roster. A quorum was reached. A list of attendees is included at the end of these minutes.

Chair’s Remarks

A call for essential patent claims was made. No patent claims were identified. The IEEE Copyright Policy was also shown.

Meeting Agenda

1. Welcome & Call to Order
2. Question, Essential Patent Issues, and IEEE Copyright Policy
3. Determination of Quorum (more than 3 of 6 members is necessary to have a quorum)
4. Review of IEEE 638-2013
5. New Business

Topics discussed:

The latest version of the IEEE 638-2013 document was reviewed with the group. It was highlighted to the group that IEEE 638 Standard is closely related to the other standards IEEE 323 and IEEE 344. Joe Krvavac informed the group that both of these standards are now dual logo standards with IEC: IEEE/IEC 6078-323 (2016) and IEEE/IEC 60980-344 (2020).

The proposed Title, Scope and Purpose of the IEEE 638 std. were updated to reflect this, as follows:

Title: IEEE 638 - Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations

1.1 Scope

This standard provides requirements to demonstrate the adequacy of new Class 1E transformers, located in a mild environment of a nuclear power generating station as defined in IEEE/IEC 60780-323, to perform their required safety functions under postulated service conditions. This standard applies to single- and three phase transformers rated 601 V to 15000 V for the highest voltage winding and up to 2500 kVA (base rating).

1.2 Purpose

The purpose of this standard is to provide specific qualification procedures for Class 1E transformers to demonstrate their capability to meet the requirements of IEEE/IEC 60780-323. The transformer shall perform its intended function under all specified service conditions.

New Business

A motion to present the updated title, scope and purpose to the Power Transformers Subcommittee for a vote to proceed with obtaining a PAR for revision of IEEE 638 was made by Joe Krvavac of Sargent & Lundy and seconded by Thrinadha Katapalli of Virginia Transformer. The motion passed with unanimous approval of the 6 members present.

The was meeting adjourned at 12:00 pm with a motion by Joe Krvavac of Sargent & Lundy and seconded by Thrinadha Katapalli of Virginia Transformer. The group plans to meet as a WG at the Fall 2023 Meeting in Kansas City, MO.

Best regards,
Craig Swinderman
Chair – IEEE 638

List of Meeting Attendees at Spring '23 Meeting, including affiliation & voting member status.

<i>Name</i>	<i>Company</i>	<i>Role</i>
Craig Swinderman	Mitsubishi Electric Power Products, Inc.	Member
Scott Thomas	Hitachi Energy	Guest
Thrindadha Katapalli	Virginia Transformer	Member
Anil Saulant	Virginia Transformer	Guest
Viveh Blatt	Prolec GE Waukesha	Guest
Tommy Nunn	JST	Guest
Alexander Larysch	Siemens Energy	Guest
Eric Euvrard	RHM International	Guest
Robert Middleton	RHM International	Guest
Muhammad Abdullah Sohail	Trench Canada	Member
Jusuf (Joe) Krvavac	Sargent & Lundy	Member
Juan Alfredo Carmzales	Prolec GE	Guest
Ryan Musgrove	Oklahoma Gas & Electric	Member
Alex Alahmed	Evergy	Member

Power Transformers Subcommittee Working Group PC57.135 Report

Document #: C57.12.135

Document Title: Guide for the Application, Specification , and Testing of Phase-Shifting Transformers

Chair: Ewald Schweiger Vice-Chair: Open

Secretary: Richard von Gemmingen

Current Draft Being Worked On: 1.0 Dated: NA

Meeting Date: 2023-03-20 Time: 1:45 PM – 3:00 PM

Attendance:	Members	12
	Guests:	30
	Total	42

Meeting Minutes of Working Group Meeting:

1. Meeting was called to order at 1:47 PM (CDT) with Welcome & Chair's remarks.
2. Quorum Check
Quorum was achieved with 12 of 18 members present.
3. Approval of the Agenda
Eric Davis made motion to approve Agenda, Ryan Musgrove provided second. Motion was carried unanimously with no objections or abstentions.
4. Approval of the Fall 2022 minutes
Eric Davis made motion to approve Agenda, Marcus Stank provided second. Motion was carried unanimously with no objections or abstentions.
5. Call for Essential Patents
A call for essential patents was made. No essential patents or issues were reported.
6. Copyright policy
The IEEE copyright policy was reviewed. No issues were reported.
7. Update on status of C57.135 and IEC collaboration
 - a. Joe Watson proposed this will be a dual logo document with IEC. IEEE is currently in process of preparing for Dual Logo.
 - b. Kevin Juchem is representative of IEC for their side of Dual Logo. Kevin indicated that IEC needs to appoint the technical experts to get process moving from IEC side. In general there will need to be harmonization between the IEEE and IEC in that certain things such as the word "Guide" cannot appear in IEC documents, so the IEEE Par and Title may need to be revised. These are formalities and work can continue for review of the guide.
8. Joe Watson presented an update on identified changes needed.
The only copy of the C57,135 Guide that Joe had is a Dual Logo reference.
From this he presented his thoughts on Sections 5,6, and 12.

Section 5.1 is Usual Service Conditions with items A to F, however A seems to be performance requirements instead of service conditions.

Section 5.4 is more on protection and relays, recommends removing

Section 6 is full of words like "Shall" that cannot be used in Guides and will need to be reviewed and revised

Section 12 recommends adding a section on Specifying PST's, or create a new section 13 dedicated to information on Specifying PST's

Other Comments:

Section 9 is on control systems. Typically, this is outside the scope of the PST manufacture, and usually provided by the substation controls and protection coordinators. Should this be in the guide?

Section 4 some diagrams need correction

Section 5 other comments

Section 6 other comments

Section 7 construction of PST – review

Section 8 Short Circuit review

Section 9 recommends removing

Section 10 on testing need to get input from manufacture testing specialists

Section 11 review tolerances

Section 12 the check list is missing

9. Call for Volunteers to begin review of C57.135 document

Section 5 - Eric Davis volunteered to review

Sections 3, 5, 6 and 12 – Sanjay Patel and Joe Watson volunteered to review

Section 4 – Alfons Schrammel volunteered to review

Section 4 and 6 – Sebastian Rehkopf volunteered to review

Section 7 – Joe Watson and Rich von Gemmingen will look at

Section 8 – Thrinada Katapalli will review

Section 9 – this is usually done by substation controls systems experts. Should it stay in document.

Section 10 and 11 – Jos A.M. Veens will review

Section 12 – Ryan Musgrove agreed to review.

10. Sanjay Patel initiated additional question working in parallel with IEC. Kevin Juchem addressed this and explained that after IEC experts are nominated, they will proceed with review and recommendations at IEC in similar manner as IEEE.

11. New business

No new business was introduced.

12. Motion to adjourn meeting was issued by Markus Stank and seconded by Sanjay Patel. The meeting was adjourned at 2:45 PM (CDT)

13. List of attendees for this meeting:

Name	Last name	Given name	S2023 Milwaukee BEFORE Status
Arritt Robert	Arritt	Robert	G
Bonfiglio Susan	Bonfiglio	Susan	G
Brodeur Samuel	Brodeur	Samuel	G
Calitz David	Calitz	David	G
Chan Vivian	Chan	Vivian	G
Colopy Craig	Colopy	Craig	G
Davis Eric	Davis	Eric	M
Fedor Ken	Fedor	Ken	G
Gupta Ravi	Gupta	Ravi	G
Gustavsson Niklas	Gustavsson	Niklas	M
Hanson Corey	Hanson	Corey	G
Heiden Kyle	Heiden	Kyle	G
Hoffman Saramma	Hoffman	Saramma	G
Katapalli Thrinadha	Katapalli	Thrinadha	G
Kevin Juchem	Juchem	Kevin	G
Kainerder Kurt	Kainerder	Kurt	M
Mazzei Kevin	Mazzei	Kevin	G
Mendez Zamora Omar	Mendez Zamora	Omar	G
Mohamed Marian	Mohamed	Marian	G
Montanha Juliano	Montanha	Juliano	G
Musgrove Ryan	Musgrove	Ryan	M
Orozco Eduardo Polo	Ozorzco	Eduardo	G
Patel Sanjay	Patel	Sanjay	M
Reed Scott	Reed	Scott	G

Rehkopf Sebastian	Rehkopf	Sebastian	M
Rock Patrick	Rock	Patrick	G
Sandsten Lina	Sandsten	Lina	G
Schindler Stefan	Schindler	Stefan	G
Schrammel Alfons	Schrammel	Alfons	M
Schweiger Ewald	Schweiger	Ewald	M
Scott Thomas	Scott	Thomas	G
Stank Markus	Stank	Markus	M
Stechschulte Kyle D	Stechschulte	Kyle D	M
Tarango Erivil	Tarango	Erivil	G
Jos A.M. Veens	Veens	Jos A.M.	G
Viereck Karsten	Viereck	Karsten	G
vonGemmingen Richard	vonGemmingen	Richard	M
Washburn Alan	Washburn	Alan	G
Watson Joe	Watson	Joe	M
Weyer Daniel	Weyer	Daniel	G
White Joe	White	Joe	G
Williams Trenton	Williams	Trenton	G

14. Guests requesting: membership

Of the 30 guests, 11 requested membership. Of these 11 guests, 4 are working on tasks or have attended both sessions of this working group.

Recommendation is to accept these 4 as new members, (Williams Trenton, Mendez Zamora Omar, Kevin Juchem and Thrinada Katapalli). If others who requested membership return at next meeting, then they will also be granted membership.

Next meeting – October 2023 in Kansas City

Submitted by: Secretary Richard von Gemmingen

Date: 03/28/2022

C57.143 – IEEE Guide for Transformer Monitoring
Monday, March 20, 2023
Minutes of WG Meeting

The meeting was called to order at 3:15 PM by Chair Mike Spurlock. Vice-Chair Poorvi Patel was present. Secretary Elizabeth Bray (writer of Minutes) was also present.

There were 52 of 96 members present. There were 62 guests, and 15 guests requesting membership. A membership quorum was achieved. The attendance for this meeting was as follows:

- Number of Members in Activity = 96
- Number of Members Present = 53
- Percentage of Members Present = 54%
- Number of attendees = 114
- Attendees requesting Membership = 15

List of Meeting Attendees is provided below.

Last Name	First Name	Status
Almeida	Nabi	Member
Alonso	Carlos	Guest
Arora	Kush	Guest
Arritt	Robert	Guest
Bargone	Gilles	Member
Berube	Jean-Noel	Member
Bolar	Sanket	Guest
Bonfiglio	Susan	Guest
Bradshaw	Jeremiah	Member
Bray	Elizabeth	Member
Calitz	David	Member
Cantu de Leon	Jorge	Guest
Carrizales	Juan Alfredo	Guest
Casey	Cole	Guest
Castellanos	Juan	Guest
Chambers	Stuart	Member
Cheatham	Jonathan	Member
Colopy	Craig	Guest
Craven	Michael	Guest
Da Silva	Roberto Ignacio	Guest
Debass	Sam	Guest
Delgado Zamora	Gabriel	Guest
Draper	Zachary	Guest
Dulac	Hakim	Member
Ermakov	Evgenii	Guest
Espindola	Marco	Member
Farreira	Marcos	Guest

Faur	Florin	Member
Fazlic	Zlatan	Member
Felton	Todd	Guest
Foata	Marc	Guest
Frimpong	George	Member
Gara	Lorne	Member
Gaun	Alexander	Guest
Gross	Detlev	Member
Guner	Ismail	Member
Gustavsson	Niklas	Member
Gyore	Attila	Guest
Hanson	Corey	Guest
Harley	John	Member
Hayes	Roger	Member
Heiden	Kyle	Member
Hoffman	Saramma	Member
Hollrah	Derek	Member
Hopkins	Traci	Guest
Jacob	Nathan	Guest
jPiecevil	Urog	Guest
Kessler	Stacey	Member
Klempner	Dmitriy	Member
Kulasek	Krzysztof	Member
Lachance	Mathieu	Guest
Lewand	Lance	Guest
Mabrey	Stephanie	Member
Machain	Jose Luis	Guest
Mani	Kumar	Member
Mayer	Robert	Member
McBride	James	Member
Mellin	Toni	Guest
Mendez	Omar	Guest
Morales-Cruz	Emilio	Member
Munoz Molina	Martin	Member
O'Malley	Anastasia	Member
Pappas	Michael	Guest
Patoyga	Jarosz	Guest
Patel	Poorvi	Member
Portillo	Homero	Guest
Pruente	John	Member
Radbrandt	Uif	Guest
Reed	Scott	Member
Reeder	Perry	Guest

Rehkopf	Sebastian	Guest
Richardson	Michael	Guest
Robalino	Diego	Guest
Rock	Patrick	Guest
Rocque	Tim	Guest
Rossini	Yuri	Guest
Rutledge	Chris	Guest
Saad	Mickel	Member
Sawicki	Mike	Guest
Schindler	Stefan	Guest
Schweiger	Ewald	Guest
Shteyh	Ibrahim	Guest
Sinclair	Jonathan	Member
Snodgrass	Jonathan	Guest
Soeller	Markus	Guest
Soto	Mauricio	Member
Sparling	Brian	Member
Spurlock	Mike	Member
Staley	Brad	Member
Stank	Markus	Member
Steckschulte	Kyle	Member
Steigen	Ethan	Guest
Steineman	Christopher	Guest
Sullivan	Christopher	Guest
Syed	Ali	Guest
Szczechowski	Janusz	Member
Sze	Matthew	Guest
Tolcachir	Eduardo	Guest
Tostrud	Mark	Member
Trifunoski	Risto	Guest
Uhlmann	Olivier	Guest
Veeran	Kannan	Guest
Waldrop	Hugh	Member
Wang	Evanne	Guest
Watson	Joe	Member
Webb	Matthew	Member
Welton	Drew	Member
White	Elliott	Guest
White	Joe	Guest
Whitehead	William	Member
Williams	Trenton	Member
Woods	Deanna	Member
Wright	Jeffrey	Member

Yeboah
Zanwar

Kwasi
Anand

Guest
Guest

Agenda

1. Welcome & Introduction
2. Call for Patent Disclosure/Review Copyright Policy/Review Individual Participation Process
3. Chair Remarks
4. Quorum Check
5. Approval of Agenda
6. Approval of Fall 2022 Meeting Meetings
7. Status of MEC Review/Ballot for the final draft
8. Discussion/entertain motions.
9. Next Steps
10. New Business

Chair Mike Spurlock asked of a call for patents disclosure was made and no patent claims were reported.

Chair Mike Spurlock reviewed the IEEE Copyright policy and the individual participation as to act and vote based on your individual expertise.

Chair Mike Spurlock gave a history of the effort over the last few years as well as get the team up to speed on recent activities and upcoming dates. January 31, 2023, an email ballot to request to move the draft guide to ballot was approved by the C57.143 WG with an 82% response rate and 99% approval rate. The Power Transformers Subcommittee (PTSC) on March 3, 2023 approved a motion to move the draft guide to ballot with a 78% response rate and 100% approval rate.

A Quorum check was conducted and a count of 53 members raised their hands. This count was double checked. Quorum was achieved.

A motion to approve the Spring 2023 agenda was made by Trent Williams and seconded by Kumar Mani. There were no objections.

A motion to approve the Fall 2022 meeting minutes was made by Scott Reed and seconded by Trent Williams. There were no objections.

The ballot invitation was sent out March 18, 2023 and closes April 17th. If you have not received the ballot email let Chair Mike Spurlock know since there were several emails not correct in the system several did not receive the invite.

In order to cast your ballot you must be a SA member. You can join if not a member of SA. Members and guest of this working group are allowed to contribute comments to this document.

The draft is available for review if you need a copy please bring this to the attention of Chair Mike Spurlock. It was stated in the meeting that the C57.143 link was not functioning at the time of the meeting. This was addressed after the meeting.

We need a 75% return of ballots with a 75% approval rate. The challenge is to meet the PAR deadline by the end of the year. This will be determined by the number of comments received. There was discussion of a comment resolution group.

A motion to create a comment resolution group was made by Jeremiah Bradshaw seconded by Trent Williams and everyone agreed. There was a call for volunteers to resolve comments and those were asked to come forward at the end of the meeting to collect names.

A question was raised about worry about the PAR extension. Mike responded it will depend on the number of comments. Joe Watson added that a PAR extension would be automatic since we are in the balloting phase.

Chair Mike Spurlock then asked if there was any new business. The discussion was around the conclusion of this working group and how to turn this work into a tutorial after the guide is published. Rugged Monitoring has offered to assist with the tutorial. Discussion around the amount of material as well as the balance of commercial interest. Brian Sparling shared his experience with the Cigre presentation on the same topic and will present that presentation to this team.

A motion to form a study group to discuss how to present the tutorial was made by Drew Welton and seconded by Bill Whitehead. Volunteers were asked to come forward after the meeting to sign up to assist with this study group. The motion unanimously passed. This study group will report during the fall meeting. Sammy Debass and Brian Sparling volunteered to lead this study group.

Chair Mike Spurlock signed into MyProject to show how to accept a ballot invite. Key takeaway if you do not have your preferences set up you will need to search for C57.143. Join ballot, select affiliation, and submit.

A motion to adjourn was made by Jeremiah Bradshaw and seconded by Bill Whitehead. The motion passed with unanimous approval. The meeting adjourned at 4:08pm.

Power Transformers Subcommittee Working Group Report

Document #:	C57.125		
Document Title:	Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors		
Chair:	Hakan Sahin	Vice-Chair	Thomas Melle
Secretary	Adam Sewell	Percent Complete	30%
Current Draft Being Worked On:	1.0	Dated:	n/a
PAR Expiration Date:	December 31, 2025		
Meeting Date:	20 March 2023	Time:	4:45pm – 6:00pm
Location:	Milwaukee, WI, USA		
Attendance:	Members	26 of 38	
	Guests	79	
	Guests Requesting Membership	17	
	Total*	105	

* Attendance list for this meeting is shown at end of meeting minutes

Meeting Minutes / Significant Issues / Comments:

Meeting was called to order at 4:45pm, March 20, 2023.

1. Administrative

- a. IEEE Patent Policy and Call for Patents
 - i. No comments from group
- b. IEEE SA Copyright Policy
 - i. No comments from group
- c. Review of agenda
 - i. No comments from group
- d. Reminder on the purpose and the scope of the working group, and the timeline
 - i. The expectation from this WG is to review and update the document as it expires on 12/31/2025.
 - ii. Expected Date of submission of draft to the IEEE SA for Initial Standards Committee Ballot: May 2024. Projected Completion Date for Submittal to RevCom: Dec 2024
- e. Introductions of the attendees
 - i. Attendance sheets were passed out. Name/affiliation was announced as attendees spoke during the meeting.

- ii. Secretary asked all who wanted on email distribution for the C57.125 Working Group to send him an email at: adamsewell@ieee.org
- f. Updated membership review and count for quorum
 - i. 38 members and 20 were counted as present. QUORUM ACHIEVED
 - ii. Attendance sheets after meeting completed showed 26 members attended.
 - iii. Members are expected to attend and stay in the meeting so business can be conducted.
- g. Approvals of previous documents needed but not made due to lack of quorum previously:
 - i. Approval of the agenda
 - ii. Approval of the Fall_21 unapproved meeting minutes
 - iii. Approval of the Spring_22 unapproved meeting minutes
 - iv. Approval of the Fall_22 unapproved meeting minutes
 - v. Motion to approve all shown – W.Binder, 2nd – E.Garcia
 - 1. No objection to unanimous approval – ALL APPROVED

2. Old Business

- a. Review the changes proposed for Section 4.2 Investigation flow chart
 - i. Task force leader – E.Morales-Cruz, Task Force members – S.Chambers, R. Hernandez

Current Document:

4.2 Investigation flow chart

For many companies, it may be desirable to perform selected tests. Figure 1 has been developed to aid in the determination and investigation of a transformer failure. This flowchart forms the basis for this guide. The two starting points for this flowchart are (1) transformer tripped or malfunctioned, and (2) routine tests show deviation from past. Routine tests include those listed in Table 4 and Table 5.

The paths in the flowchart lead either to scrapping or returning to service. Prior to returning to service, it may be desirable to perform selected tests to verify suitability for service that includes the commissioning tests described in IEEE Std C57.152. Following return to service, it is suggested that the transformer be monitored by periodic electrical tests and tests that include **insulating liquid sampling for dissolved gas Analysis**. If a transformer is to be scrapped, it is suggested that the degree of polymerization (DP) and moisture content tests be performed on samples from the transformer in accordance with the recommendations found in IEEE Std C57.140.

- 1.
 - ii. Discussions were made on the above highlighted sentence to add “Oil quality”, on top of dissolved gas analysis. Chair will finalize proposal via off site meeting, and email to working group for approval before Fall 2023 meeting
- b. Review the changes proposed for Section 5.3.6.3 Testing under vacuum. This old business is related to the testing under vacuum being unsafe and not recommended.
 - i. Task force leader- Ed teNyenhuis, Task force member-Akash Joshi worked on the change and proposed that testing under vacuum is strongly not recommended.

Current Document:

5.3.6.3 Testing under vacuum

Some users have a practice of performing de-winding resistance measurements under vacuum while performing dry-outs to determine the insulation temperature. Caution shall be used when tests are performed on the transformer while the equipment is under vacuum. The dielectric strength of the system is significantly reduced under these conditions; only sufficiently low voltage should be used, and users should consult with the manufacturer to obtain recommended voltage level or actions.

testing under vacuum is not recommended Because vacuum significantly reduces dielectric strength.

- ii. Motion was made to replace the wording in Section 5.3.6.3 Testing under vacuum with this wording: "Testing under vacuum is not recommended because vacuum significantly reduces dielectric strength."
 1. Motion-B.Forsyth, 2nd-S.Chambers
 2. 17 YES votes - APPROVED
- c. Review the changes proposed for Table-2
 - i. Task force leader – James Cross – not in attendance at this meeting
 - ii. There was general agreement to add switches, breakers, fuses to table.
 - iii. Chair will work with TF leader and group via emails to follow up before Fall 2023 meeting
- d. Review the changes proposed for Table 4 – Electrical tests
 - i. Task force leader – H.Sahin
 - ii. Vice Chair-T.Melle assumed duties of Chair.
 - iii. Motion was made to add to Table-4 as presented:

Table 4—Electrical tests

		Probable areas of concern			
		Major insulation— electrical	Minor insulation— electrical	Mechanical damage (short-circuit forces, etc.)— mechanical	May indicate problem location
					Indicates electrical path from core to ground
✓	Common field tests				
	Insulation resistance				
	Winding to winding	X			X
	Winding to ground	X			X
	All windings to ground	X			X
	Core to ground				X

Core Clamp to ground *

X

* Applicable for isolated core clamps only

- iv. Core Clamp to ground *Applicable for isolated core clamps only with Mechanical damage (short-circuit forces, etc.)-mechanical as probable area of concern.
 1. Motion-H.Sahin, 2nd-B.Forsyth
 2. No objections to unanimous approval – APPROVED
- v. T.Melle returned to duty as Vice Chair
- e. Review the changes proposed for Table 7-Field test interpretation
 - i. Task force leader-A.Sarkar, Task force members-W.Li, A.Joshi

- ii. Motion was made to add “Core Clamp heating” to the table 7 under Suspected problem category with “Abnormal gas analysis” as First priority and “Abnormal oil quality and particle count” as Second priority as presented.
 1. Motion-A.Sarkar, 2nd-P.Panesar
 2. No objections to unanimous approval – APPROVED

Table 7—Field test interpretation

Suspected problem category	Significant test data		
	First priority	Second priority	Third priority
Shorted winding turn (minor insulation)	Abnormal gas analysis ^k Increase in excitation ^c Out of tolerance ratio ^{bi}	Abnormal open circuit FRA ^l	Abnormal winding resistance ^g
Open winding circuit	Out of tolerance ratio ^{bi}	Higher resistance ^g	Abnormal FRA ^l
Moisture	High insulation power factor ^d	Insulating liquid tests low dielectric, high moisture ^f	Low insulation resistance ^h
Damage to major insulation	High insulation power factor ^d	Low insulation resistance ^h	Abnormal FRA ^l
Through-fault mechanical damage	Abnormal FRA ^l	Higher impedance ^e	Change in winding capacitance (PF/CAP test) ^d
Core heating	Abnormal gas analysis ^k	Low core ground resistance ^b	Increase in excitation ^c

NOTE—Refer to the standard/clause listed in the footnotes for help in interpreting the results of each test.

Core Clamp heating

Abnormal gas analysis

Abnormal oil quality and particle count

- f. Review the changes proposed for Table 8-Internal inspection-main tank
 - i. Task force leader-T.Raymond, Task force member-S.Chambers
 - ii. These changes will be worked on via email before Fall 2023 meeting
- g. Review the changes proposed for Section 6.3.3.3 Troubleshoot a winding failure
 - i. Task force leader-H.Sahin
 - ii. No change is required. This is under 6.3.3 Winding failure modes for shell form transformers. Layer windings are clearly covered under 6.3.2 Electrical winding failure modes for core form transformers
 - iii. Close this old business with no further action required
- h. Review the changes proposed for Introduction section
 - i. Task force leader-H.Sahin
 - ii. W.Binder discussed that historical description of how the guide standards are created are typically put in the introduction if space allows.
 - iii. Chair will finalize proposal for Introduction section and email before Fall 2023 meeting.

3. New Business

- a. B.Forsyth brought forward several proposals for changes in the Definitions section. After the meeting, Bruce emailed his proposals, which are as follows:

“Proposed changes are shown in **red** with proposed deletions shown with a line through the text to be deleted. I ask that you consider presenting these comments to the WG for discussion at our next meeting. I would suggest these be handled one at a time, since some may be accepted, some may be rejected, and some may be accepted with modifications.

Item 1: compressive force

Existing Definition: (A) The force that presses the inside coil toward the core.
 (B) The force attraction that presses coils wound in opposite directions together in a set of pancake coils.

Proposed Change: (A) The force that presses the inside coil toward the core.
(B) The force ~~attraction~~ that presses coils wound in opposite directions together in a set of pancake coils.
(C) The axial force applied to pre-compress core form windings to prevent uncontrolled axial movement in service.

Justification: a) The word “attraction” seems out of place or is possibly missing the word “of” in front of it.
b) Item (C) provides a definition of an important compressive force that is not described elsewhere.

Item 2: hoop compression / buckling

Existing Definition: There is no current definition.

Proposed Change: The radially inward force that acts on a coil.

Justification: Hoop compression (buckling) is a common failure mode and contrasts with hoop tension, which is already defined.

Item 3: main tank

Existing Definition: The steel container for the main coil and insulating liquid (liquid or gas).

Proposed Change: The ~~steel~~ metallic container for the main core and coil assembly and insulating liquid (liquid or gas).

Justification: a) While rare, some tanks are aluminum.
b) The phrase “core and coil assembly” is a more thorough description of what goes in the tank.

Item 4: spiral winding (transformer winding)

Existing Definition: Many insulated conductors in parallel, often two strands wide and many (6 to 20) strands high, spirally wound on an insulating cylinder from one end to the other. Continuously transposed cable may also be used. The spiral winding resembles a spring coil. Syn: **helical winding**.

Proposed Change: Many insulated conductors in parallel, often two strands wide and many ~~(6 to 20)~~ strands high, (typically from 6 to 20), spirally wound on an insulating cylinder from one end to the other. Continuously transposed cable may also be used. The spiral winding resembles a spring coil. Syn: **helical winding**.

Justification: This guide should not imply absolute limits.

Item 5: strap-wound coils (transformer winding)

Existing Definition: Single or multiple layer conductors, from 25 mm to 75 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. The conductors can be aluminum or copper. This type of winding can consist of two or

more groups electrically connected in parallel. Typically used in low-voltage windings.

Proposed Change: Single or multiple layer conductors, typically from 25 mm to 75 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. ~~The conductors can be aluminum or copper.~~ This type of winding can consist of two or more groups electrically connected in parallel. Typically used in low-voltage windings.

Justification: a) This guide should not imply absolute limits.
b) The conductor material is not necessary for the definition.

Item 5: strip-wound coils (transformer winding)

Existing Definition: Single conductors, typically 75 mm to 250 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. The conductors can be aluminum or copper. This type of winding can consist of two or more groups electrically connected in parallel. Typically used in low-voltage windings.

Proposed Change: Single conductors, typically 75 mm to 250 mm wide, spirally wound around an insulating form, with a layer of insulation between conductors. ~~The conductors can be aluminum or copper.~~ This type of winding can consist of two or more groups electrically connected in parallel. Typically used in low-voltage windings.

Justification: The conductor material is not necessary for the definition.

Item 6: user

Existing Definition: The owner of the transformer.

Proposed Change: The ~~owner~~ operator of the transformer.

Justification: Not every owner of a transformer is the user.
i. Chair will work via emails with members before the Fall-23 meeting.

4. Membership changes

- a. Officers will look at attendance of members and change membership based on attendance before Fall 2023 meeting. Guest-RM2 will be reviewed for membership.

5. Next meeting: October 23, 2023 at the Fall 2023 Transformer Committee Meeting scheduled for October 22-26, 2023, Kansas City, MO, USA.

6. Close of meeting

- a. Meeting adjourned at 6:00pm
 - i. Motion-S.Som, 2nd-W.Binder

Submitted by: Hakan Sahin Date: 4/8/23

3/20/2023 Meeting Attendance (RM = Request Membership):

Last Name	First Name	Company (Affiliation)	Role	Last Name	First Name	Company (Affiliation)	Role
Alahmed	Alex	Energy-Wolfcreek	Guest	Leigl	Angela	EATON Corporation	Guest
Bargone	Gilles	FISO Technologies Inc.	Guest	Li	Weijun	Braintree Electric Light Dept.	Member
Beaster	Barry	H-J Family of Companies	Guest	Mazzei	Kevin	Black & Veatch	Guest
Betancourt	Enrique	Prolec GE	Member	Melle	Tom	Highvolt	ViceChair
Binder	Wallace	WBBinder Consultant	Member	Middleton	Robert	RHM International	Guest
Boettger	William	Boettger Transformer Consulting LLC	Member	Mills	Francis	Power Engineers	Guest
Bolar	Sanket	Oncor	Member	Montanha	Juliano	Siemens Energy	Guest
Bonfiglio	Susan	WAPA	Guest	Morales-Cruz	Emilio	Qualitrol	Guest-RM2
Borck	Christopher	EATON Corporation	Guest	Munoz	Marta	Hitachi Energy	Guest
Bradshaw	Jeremiah	Bureau of Reclamation	Guest	Murray	David	TVA	Guest-RM2
Bray	Elisabeth	Southern Company	Guest	Musgrove	Ryan	Oklahoma Gas & Electric	Member
Cantu	Jorge	Alliant Energy	Guest	O'Malley	Anastasia	Consolidated Edison Co. of NY	Member
Casey	Cole	Invenergy	Guest	Orozco	Polo	GE Grid Solutions	Guest
Castro	Fidel	SDGE	Guest	Panesar	Parminder	Virginia Transformer Corp.	Member
Chambers	Stuart	Powertech Labs	Member	Patel	Sanjay	Smit Transformer	Member
Craven	Michael	Qualus Power Serv.	Guest	Pellon	Verena	FPL	Guest
Crochett	Daniel	Ameren	Guest-RM1	Persivec	Igor	Siemens Energy	Guest
DaSilva	Roberto	Cargill, Inc.	Guest	Plecevic	Uros	Invenergy	Guest
Debass	Samson	EPRI	Guest-RM1	Plisic	Goran	Siemens Energy	Guest
Delgado Zamora	Gabriel	Invenergy	Guest	Prunte	John	Prolec GE Waukesha	Member
Demir	Yasm	Prolec GE	Guest	Rodriguez	Leopoldo	Transformer Testing Services LLC	Guest-RM2
Dillon	Nikolaus	Dominion Energy	Guest-RM2	Saad	Mickel	Hitachi Energy	Member
Dolloff	Paul	East Kentucky Power	Guest	Sahin	Hakan	Virginia Transformer Corp.	Chair
Draper	Zachary	Delta-X Research	Guest-RM1	Sarkar	Amitabh	Virginia Transformer Corp.	Member
Dulac	Hakim	Advanced Power Technologies	Guest	Scardazzi	Alaor	Siemens Energy	Guest
Euvrard	Eric	RHM International	Guest	Schrammel	Alfons	Siemens Energy	Guest
Faur	Florin	Prolec GE Waukesha	Guest-RM2	Schwartz	Dan	Quality Switch, Inc.	Member
Flores	Hugo	Hitachi Energy	Guest-RM1	Selvaraj	Pugal	Virginia Transformer Corp.	Member
Forsyth	Bruce	Bruce Forsyth and Associates PLLC	Member	Sewell	Adam	Quality Switch, Inc.	Secretary
Frye	Richard	EATON Corporation	Guest	Sohail	Muhammad	Trench Canada	Guest-RM1
Garcia Wild	Eduardo	Siemens Energy	Member	Solano	William	Maschinenfabrik Reinhausen	Guest
Gardner	James	Prolec GE Waukesha	Guest	Som	Sanjib	Pennsylvania Transformer	Guest-RM1
Gorzin	Allis	Black & Veatch	Guest	Soyoung	Lee	Hyundai Electric	Guest
Gragert	Jeffrey	Xcel Energy	Guest	Stechschulte	Kyle	AEP	Guest
Gustavsson	Niklas	Hitachi Energy	Guest	Steineman	Chris	Delta Star Inc	Guest
Hernandez	Carlos	Delta Star Inc	Guest-RM1	Szczecowski	Janusz	Maschinenfabrik Reinhausen	Member
Hernandez	Ronald	Doble Engineering Co.	Member	Sze	Matthew	Omicron	Guest
Hoffman	Saramma	PPL	Guest	Talbert	Chris	JST	Guest
Ivanic	Lidija	Siemens Energy	Guest	Tanaka	Troy	Burns & McDonnell	Member
Jacob	Nathan	Camlin Energy	Guest-RM1	Thielbar	Jacob	WAPA	Guest
Jaros	Patricia	IEEE	Guest	Thomas	Scott	Hitachi Energy	Guest
Johnson	Christopher	Oncor	Guest	Tuli	Subhash	ET & DA	Guest
Kazmierczak	Jerzy	Hitachi Energy	Guest	Veens	Jos	SMIT Transformatoren B.V.	Guest
Kerschenbouer	Christoph	Siemens Energy	Guest	Veeran	Kannan	Georgia Transformer	Guest
Kessler	Stacey	Ulteig Engineers	Guest-RM1	Vir	Dharam	Prolec GE Waukesha	Guest-RM2
Khan	Qasim	NEETRAC-GT	Guest	vonGemmingen	Richard	Dominion Energy	Member
Klempner	Duritriy	Southern California Edison	Guest	Washburn	Alan	Burns & McDonnell	Member
Knapp	Evan	EATON Corporation	Guest	Whitten	Christopher	Hitachi Energy	Guest
Kowalski	Rafal	Hitachi Energy	Guest	Woods	Deanna	Alliant Energy	Member
Kulasek	Krzysztof	Delta Star Inc	Guest	Yuan	Guang	Hitachi Energy	Guest-RM1
LaBean Jr	Bernard	Consumers Energy	Guest	Yun	Joshua	Virginia Transformer Corp.	Guest-RM2
Lachance	Mathieu	Omicron	Guest	Zibert	Kris	Allgeier Martin	Guest
Lee	Junho	Hyundai Electric	Guest				

IEEE PES Transformers Committee

Working Group PC57.170 Condition Assessment Guide

Spring 2023 Meeting Minutes

- **Meeting Date: March 21, 2023, 8:00-9:15 AM (CST)**
- **Venue: Hotel Hyatt Regency, Milwaukee, WI**

Total Attendees: 101; Total Members Present: 40 (out of 50); Guests Present: 61
Guest Requesting Membership: 16; Quorum: 80%.

1. The chair outlined the IEEE Patent disclosure policy, and no disclosure was noted.
2. The chair outlined the IEEE Copyright Policy.
3. A membership quorum was polled, and a quorum was established.
4. A motion for adoption of this Spring 2023 meeting's agenda was moved: Approved unopposed.
5. A motion for adoption of Fall 2022 Meeting Minutes was moved: Approved unopposed.
6. The Chair informed the working group that a guide draft had been circulated to members prior to this meeting. The Chair threw open the floor for questions on the draft guide content for Task forces #1, #2 and #3 and task force updates were provided by:
 - 6.1. Emilio (subbed for TF#1 Leader) and Brian Sparling for Chapters 4 and 5. They reported that these sections were complete and in stable condition. The editorial review for these chapters is ongoing. A suggestion was made by Evgenii from Hitachi about including guidance on how to use the guide.
 - 6.2. Saramma Hoffman (TF#2 Leader) for Chapters 6, 7 and 8. The chapters are complete and in stable condition. The editorial review for these chapters is ongoing.
 - 6.3. Jonathan Sinclair for (TF#3 Leader) for Chapters 9, 10 and 11. Jonathan reported that their task force had made excellent progress on these chapters. Marcos Ferreira offered to help add some additional information for the OLTC section. Poorvi, Jonathan and Diego are working on adding some new information to the section related to bushings. The editorial review for these chapters is ongoing.
7. The chair gave an update on the PAR expiration date of 12/31/2023. Going by the progress of the guide so far, he remarked that a PAR extension will be required until Dec 31, 2025. A motion was made for extending the PAR until Dec 31, 2025, by Hemchandra and it was seconded by Poorvi Patel from EPRI with none opposed.
8. The Chair then opened the floor for comments and questions:
 - Poorvi Patel has suggested adding a flow chart on how to use the guide in Chapter 4 or 5.
 - Brian Sparling spoke about papers that have been written about how using different methodologies can result in different conclusions and the guide list many methodologies and it for the asset owners to select the methodology that suits them the most.
 - Hemchandra Shertukde commented that all Normative references should be in the body while the Informative references should be in the Annexes.
9. The Chair announced that James Gross will help Stephanie Mabry with the editing of document going forward while Brain Sparling will examine the flow of the guide after editing

is completed and will make technical editorial suggestions. He added that draft document was in good shape, and that we are planning to send the draft guide after editing for a straw ballot to the working group for comments before May 15, 2023.

10. The meeting was adjourned at 09:15 am.

Kumar Mani
Chair

James Cross
Vice Chair

Akash Joshi
Secretary

List of Attendees:

Alex	Alahmed	Evergy	G
Elise	Arnold	SGB-SMIT	G
Kush	Arora	Reinhausen	G
Gilles	Bargone	Fiso	G
Jean-Noel	Berube	Rugged Monitoring	G
Enrique	Betancourt	Prolec GE	M
William	Boettger	Boettger Transformer Consulting LLC	M
Sanket	Bolar	Oncor Electric Delivery	G
Jeremiah	Bradshaw	Bureau of Reclamation	M
Elizabeth	Bray	Southern Company Services	G
Jorge	Cantu	Alliant Energy	G
Juan Alfredo	Carrizales	Prolec GE	G
Robersto	Da Silva	Cargill, Inc.	G
Samson	Debass	EPRI	G
Scott	Digby	Duke Energy	G
Nikolaus	Dillon	Dominion Energy	G
Paul	Dolloff	ekpc	G
Zachary	Draper	Delta-X Research Inc.	M
Jesse	Duffy	Nashville Electric Service	G
Hakim	Dulac	Advanced Power Technologies	M
William	Elliott	AEP	G
Evgenii	Ermakov	Hitachi Energy	M
Marco	Espindola	Hitachi Energy	M
Marcos	Ferreira	Bridge View Resources	M
Marc	Foata	MR	G
Bruce	Forsyth	Bruce Forsyth and Associates PLLC	M
George	Frimpong	Hitachi Energy	M
Lorne	Gara	Shermco	G
Miguel	Garsia	Hitachi energy	G
Ismail	Guner	Hydro-Quebec	M
Ravi	Gupta	Megger	G
Niklas	Gustavsson	Hitachi Energy	M
Attila	Gyore	M&I Materials Ltd	M
Corey	Hanson	Advanced Power Tech	G
Kyle	Heiden	EATON Corporation	M
Jean	Hernandez	Georgia tech	G
Saramma	Hoffman	PPL Electric Utilities	M
Paeryeja	Jarosz	IEEE SA	G
Stacey	Kessler	TC Energy	G

Dmitriy	Klempner	Southern California Edison	G
Rafel	Kowlaski	Hitachi Energy	G
Mathew	Lachavce	Omnicon	G
Weijun	Li	Braintree Electric Light Dept.	M
Mario	Locarno	Doble Engineering Co.	G
Jose	Machain	Prolec GE	G
Jinesh	Malde	M&I Materials Inc.	M
Robert	Mayer	Siemens Energy	G
Brian	McBride	Cargill, Inc.	G
Toni	Mellin	Vaisala	G
Marian	Mohamed	Xcel Energy	G
Emilio	Morales-Cruz	Qualitrol Company LLC	M
Ryan	Musgrove	OG&E	G
Paul	Mushill	Ameren	G
Joe	Nims	Allen & Hoshall, Inc.	M
Anastasia	O'Malley	Consolidated Edison Co. of NY	G
Mendez	Omar	Prolec	G
Ervardo	orozco	GE	G
Poorvi	Patel	Electric Power Research Institute (EPRI)	M
Sanjay	Patel	Smit Transformer	G
Monil	Patel	PG&E	G
Verena	Pellon	fpl	G
Nick	Perdanik	Weidmann Electrical Technology	G
John	Pruente	prolec energy	M
Chris	Ratledge	Dynamic Ratings, Inc.	G
Scott	Reed	MVA	M
Michael	Richardson	Ameren Corp	G
Diego	Robalino	Megger	G
Tim	Rocque	Prolec Waukesha	M
Mickel	Saad	Hitachi Energy	M
Amitabh	Sarkar	Virginia Transformer Corp.	M
Alan	Sbravati	Hitachi energy	M
Alaor	Scardazy	Siemens Energy	G
Ewald	Schweiger	Siemens Energy	G
Salahuddin	Shaikh	Hitachi Energy	G
Mike	Sharp	Trench Ltd	G
Rich	Simonali	GE grid solution	G
Jonathan	Sinclair	PPL Electric Utilities	M
Markus	Soe.essl	SGB-SMIT	G
Markus	Soeller	Power Diagnostix	M

Mauricio	Soto	Hitachi Energy	M
Brian	Sparling	Dynamic Ratings, Inc.	G
Thomas	Spitzer	City Transformer Service Co.	G
Brad	Staley	Leeward renewable energy	M
Charles	Sweetser	OMICRON electronics Corp USA	M
Matthew	Sze	Omnicon eletronics	M
Ed	teNyenhuis	Hitachi Energy	M
Felton	Todd	MVA	G
Mark	Tostardo	Dynamic Ratings, Inc.	G
Olivier	Uhlmann	Reinhausen Canada Inc.	G
Dharam	Vir	GE prolec	G
Pragnesh	Vyas	Sunbelt-Solomon Solutions	M
Alan	Washburn	Burns & McDonnell	M
Matthew	Webb	GE Prolec	G
William	Whitehead	H2scan Corporation	M
Trenton	Williams	Advanced Power Technologies	M
Dranna	Woods	Alliant Energy	G
Jeffrey	Wright	Duquesne Light Co.	M
Kwasi	Yeboah	GE Energy Management	M
Joshua	Yun	Virginia Transformer	G
Malia	Zaman	IEEE SA	G
Peter	Zhao	Hydro One	M

Power Transformers Subcommittee Task Force Report

Document #:	C57.157		
Document Title:	Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid-Immersed Transformers		
Chair:	Adam M. Sewell	Vice-Chair	N/A
Secretary	Piotr Blaszczyk	Percent Complete	N/A
Current Draft Being Worked On:	N/A	Dated:	N/A
PAR Expiration Date:	NO PAR - std expires 12/31/2025		
Meeting Date:	21 March 2023	Time:	8:00am-9:15am
Location:	Milwaukee, WI, USA		
Attendance:	Members	13 of 16	
	Guests	16	
	Guests Requesting Membership	5	
	Total*	29	
* Attendance list for this meeting is shown at end of meeting minutes			

Meeting Minutes / Significant Issues / Comments:

1. Meeting was called to order at 8:00am, March 21, 2023 at Hyatt Regency; Milwaukee, WI USA - Gilpatrick (1st floor) room.
2. Presentation of Agenda
3. Presentation of IEEE Standards Slides
 - a. Call for Patent Claims & Copyright Notice
 - b. No comments from task force about any patent claims or copyright notice
4. Distribution of attendance sheets
 - a. Please send an email to adamsewell@ieee.org with the subject: C57.157 EMAIL to be added to the C57.157 TF email list
5. Checking the Quorum - 16 members so 9 members needed for quorum
 - a. 13 out of 16 members were in attendance of that meeting so quorum was achieved.
6. Approval of the Meeting Minutes from Charlotte Fall 2022 and Agenda for Spring 2023.
 - a. Motion was made by Florin Faur and seconded by Dan Schwartz to approve Fall 2022 minutes and Spring 2023 Agenda.
 - b. No opposition to unanimous approval of the motion - APPROVED

7. Chair announcements

- a. Current guide standard is set to expire December 31, 2025
- b. This task force is to determine work needed for this guide standard and create a PAR for revision if needed

8. Old work

- a. Request was made to share previous presentations that were used to develop this guide standard
 - i. Chair posted previous presentations and 2015 C57.157 standard on IEEE Collabratec and IEEE TC Power Transformers Subcommittee pages
- b. Members of this task force were tasked to review current guide standard and previous presentations before Spring 2023 meeting and make suggestions as to what recommendations they have for this guide standard.

9. New Work

- a. During the meeting the Chair presented the following title, scope, and purpose of a PAR to revise C57.157-2015, that would include:
 - **Title:** Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid Filled Transformers.
 - **Scope:** This guide is intended for use in establishing a methodology to evaluate expected longterm performance of infrequently operated switch contacts used within insulating liquid– immersed transformers. These switch contacts are typically found in de-energized tapchangers, dual voltage switches, reversing switches, on-load tapchangers, and step-voltage regulators, but the test might possibly be used to evaluate any contact that is used in insulating liquids with similar operating characteristics and within similar environments.
 - **Purpose:** This guide outlines a test method to simulate long-term life (minimum 30 years) of a de-energized tapchanger in a period of 30 test days by using a combination of elevated liquid temperatures in conjunction with cyclically elevated load currents. The test is performed on specific switch bodies with specific contact materials, geometries, and contact pressures in liquid baths so as to closely parallel conditions found in actual operation. The variable that provides the accelerated life simulation is the switch contact temperature.
 - i. Motion was made by Dan Schwartz and seconded by Tim Tillery to create a PAR for updating C57.157-2015 with the presented wording.
 1. No opposition to unanimous approval of this motion - APPROVED
 2. This motion will be presented to the Power Transformers Subcommittee at the March 22, 2023 meeting.

10. Next meeting: October 24 at Fall 2023 Transformers Committee Meeting scheduled for October 22-26, 2023, Kansas City, MO, USA.

11. Close of meeting

- a. Meeting adjourned at 8:45am

Submitted by: Adam Sewell Date: March 24, 2023

Meeting Attendance 3/21/2023 (RM1 = Request Membership 1st time):

Last Name	First Name	Company (Affiliation)	Role
Ali	Rehan	Siemens Energy	Guest-RM1
Bhatt	Viveh	Prolec GE	Guest-RM1
Blaszczyk	Piotr	Specialty Transformer Components LLC	Secretary
Castellanos	Juan	Prolec GE	Member
Cruz Valdes	Juan Carlos	Prolec GE	Member
Dutta Roy	Samraghi	Siemens Energy	Member
Faur	Florin	Prolec GE Waukesha	Member
Gonzalez	Luis	Conduct Industries	Member
Lejay	Olivier	Huaming USA Corp.	Member
Matthews	Lee	Howard Industries	Guest
Posadas	Daniel	Prolec GE	Guest
Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Member
Saudsten	Lina	Hitachi Energy	Guest-RM1
Schindler	Stefan	Maschinenfabrik Reinhausen	Guest
Schleismann	Eric	Southern Company Services	Guest
Schwartz	Dan	Quality Switch, Inc.	Member
Sewell	Adam	Quality Switch, Inc.	Chair
Sewell	Jeremy	Quality Switch, Inc.	Member
Sewell	Russ	Quality Switch, Inc.	Guest
Solano	William	Maschinenfabrik Reinhausen	Member
Tillery	Timothy	Howard Industries	Member
Whitten	Christopher	Hitachi Energy	Guest-RM1
Newbill	Markus	Hitachi Energy	Guest
Gamboa	Jose	H-J Family of Companies	Guest
Hopkinson	Phil	Hvolt Inc	Guest
White	Joe	Power Engineers	Guest
Rainbolt	Bradley	Eaton	Guest
Murillo	Hugo	H-J Family of Companies	Guest-RM1
Harley	Jack	First Power Group LLC	Guest

PC57.150 – IEEE Guide for Transportation of Transformers and Reactors
Tuesday, March 21, 2023; 9:30 am- 10:45 am
Hyatt Regency Milwaukee, WI USA; Executive Ballroom (2)
Unapproved Minutes of Working Group Meeting

The meeting was called to order at 9:30 am by Chair Greg Anderson.
Vice-Chair Ewald Schweiger and Secretary Marnie Roussell (writer of minutes) were also present.

There was a total of 46 people present, including 18 members and 28 guests. Attendance was taken on paper rosters passed around during the meeting. A quorum was not reached. A list of meeting attendees is included at the end of these minutes.

Chairs Remarks

A call for essential patent claims was made. No patent claims were identified. The IEEE Copyright Policy was also shown.

Meeting Agenda

1. Welcome & Call to Order
2. Question, Essential Patent Issues, and IEEE Copyright Policy
3. Determination of Quorum (more than 24 of 48 members is necessary to have a quorum)
4. Approval of the Minutes from F22 in Charlotte, NC
5. Old Business
6. New Business

The Chair reviewed the timeline for the PAR expiring December 2023.

Completed Tasks:

- March '22: Collected WG Member comments to D2
- Sept-Oct '22: WG Member "Straw Vote" of D3
- Oct '22 at WG Meeting: Formed Comment Resolution Group (CRG), and the WG authorized the CRG to resolve comments during SA Ballot process.
- Oct '22 at PTSC Meeting: Received Vote of Confidence of SC
- March 8: Sent invitation to form Ballot Group (closes April 7)
- March 9: Completed Mandatory Editorial Coordination (MEC) review of D4.

Remaining Tasks:

- April 7: Document proceed to ballot (closes ~May 7)
- May-June: CRG resolves comments
- June-July: Recirculate Ballot & resolve any additional comments
- late-Summer '23: Submit the final document to RevCom

Stephen Shull advised the working group to consider the option for a PAR extension after Balloting started.

Old Business

The Chair will circulate the Fall 22 minutes for approval via email.

New Business

New business was not conducted since this meeting had not reached a quorum.

The working group has agreed to authorize the CRG to resolve all comments during the SA Ballot process.

The following people are on the CRG:

<u>LAST_NAME</u>	<u>FIRST_NAME</u>	<u>COMPANY_NAME</u>
Anderson	Gregory	GW Anderson & Associates, Inc.
Ferreira	Marcos	Bridge View Resources
Kazmierczak	Jerzy	Hitachi Energy
Lawless	Andrew	Potencia Partners
Marnie	Roussell	Entergy
Nunn	Kraig	ShockWatch
Rathi	Rakesh	Virginia Transformer Corp.
Skinger	Kenneth	Scituate Consulting, Inc.
Van Der Walt	Alwyn	Electrical Consultants, Inc.
Vijayan	Krishnamurthy	PTI Transformers

The meeting was adjourned at 10:10 am.

Immediately after the meeting was adjourned, Mr. Andy Burnes with Capital City Group gave an interesting presentation entitled "Top Current Issues in Transformer Transportation Logistics."

The WG does not plan to meet at the Fall 2023 Meeting in Kansas City, Missouri.

Greg Anderson
WG Chair

Ewald Schweiger
WG Vice Chair

Marnie Roussell
WG Secretary

C57.150 WG: List of Meeting Attendees at Spring '23 Meeting, including affiliation and voting member status.

Count	<u>LAST_NAME</u>	<u>FIRST_NAME</u>	<u>COMPANY_NAME</u>	Status
1	Ali	Rehan	Siemens Energy Inc	Guest
2	Anderson	Gregory	GW Anderson & Associates, Inc.	Chair
3	Basel	Cheryl	WEG Transformer USA	Guest
4	Bhatt	Vivek	Prolec GE Waukesha	Guest
5	Boettger	William	Boettger Transformer Consulting LLC	Member
6	Bradshaw	Jeremiah	Bureau of Reclamation	Member
7	Brodeur	Samuel	Hitachi Energy	Guest
8	Brown	Chris	San Diego Gas and Electric	Guest
9	Burns	Andrew	Bay Crane/Capital City	Guest
10	Castro	Fidel	San Diego Gas and Electric	Guest
11	Cruz Valdes	Juan Carlos	Prolec GE	Guest
12	Dolloff	Paul	East Kentucky Power	Member

Count	LAST_NAME	FIRST_NAME	COMPANY_NAME	Status
13	Fedor	Ken	SMIT Transformer Sales, Inc.	Guest
14	Ferreira	Marcos	Bridge View Resources	Member
15	Garcia Wild	Eduardo	Siemens Energy	Member
16	Grooms	Brad	Native American Trans	Guest
17	Hayes	Roger	GE Grid Solutions	Guest
18	Hollrah	Derek	Burns & McDonnell	Guest
19	Hossain	Saif	Trench Limited	Guest
20	Kazmierczak	Jerzy	Hitachi Energy	Member
21	Kowalski	Rafal	Hitachi Energy	Guest
22	Mayer	Robert	Siemens Energy	Guest
23	Mellin	Toni	Vaisala Oyi	Guest
24	Mohamed	Marian	Xcel Energy	Guest
26	Nambi	Shankar	Bechtel	Member
25	Natale	Anthony	HICO America	Guest
27	Nims	Joe	Allen & Hoshall, Inc.	Guest
28	O'Malley	Anastasia	Consolidated Edison Co.	Guest
29	Pappas	Michael	Roechling Industrial	Guest
30	Roussell	Marnie	Entergy	Secretary
31	Sarkar	Amitabh	Virginia Transformer Corp.	Member
32	Schrammel	Alfons	Siemens Energy	Member
33	Schweiger	Ewald	Siemens Energy	Vice-Chair
34	Sharpless	Samuel	Rimkus Consulting Group	Member
35	Shull	Steve	BBC Electrical Services Inc.	Guest
36	Simons	Andre	JFE Shoji Power Canada	Member
37	Skinger	Kenneth	Scituate Consulting, Inc.	Member
38	Snyder	Jason	FirstEnergy Corp.	Guest
39	Spitzer	Thomas	City Transformer Services, LLC	Guest
40	Tanaka	Troy	Burns & McDonnell	Guest
41	Thielbar	Jacob	Western Area Power Admin	Guest
42	Veens	Jos	SMIT Transformatoren B.V.	Guest
43	Wallach	David	Duke Energy	Member
44	Watson	Joe	JD Watson and Associates Inc.	Member
45	Weyer	Daniel	Monolith	Member
46	Zibert	Kris	Allgeier, Martin and Associates	Member

Task Force Meeting for IEEE Standard PC57.17

Milwaukee, Wisconsin Meeting – March 21, 2023 11:00-12:15 pm CDT

Chair: Dom Corsi

Secretary: Jason Varnell

1. The meeting was called to order at 11:00 AM CDT.
2. There were 33 active participants present. Since PAR was not yet approved and this was a task force meeting then the 14 participants that requested membership will be granted membership once the WG meets at the Fall 2023 Transformers Committee Meeting.
3. The chair reviewed the IEEE patent slides and the group made no patent claims.
4. The chair reviewed the copyright policy with the group.
5. The chair requested volunteers to help updating the standard on a clause-by-clause basis. The following participants are responsible for reviewing the sections prior to the next working group meeting and prepare to discuss recommended changes or edits.
 - a. Definitions section – Jerzy Kazmierczak from Hitachi Energy volunteered for this section.
 - b. Ratings section – Dan Sauer from Eaton Corporation and Sheldon Kennedy from Niagara Transformer
 - c. Connections section – Sanjib Som from Pennsylvania Transformer volunteered for this section.
 - d. Testing section – Dom Corsi from Doble and Jason Varnell from Doble volunteered for this section.
 - e. Construction section – Sanjib Som from Pennsylvania Transformer volunteered for this section.
 - f. Annex A – DC Arc Furnace section – Dan Sauer from Eaton Corporation and Jerzy Kazmierczak from Hitachi Energy volunteered for this section. The chair will seek additional volunteers from manufacturers (Tamini, Koncar, and Transformers and Rectifiers Limited)
 - g. Annex B – IEEE Guide for Arc-Furnace Protection section – No volunteers came forward. This section remains open for volunteers and all participants are encouraged to review the entire document and bring forward recommendations to this section. The chair will continue to seek out volunteers for this section.
 - h. Annex C – Replacement and Remanufacturing of Low Voltage Bus Bars – Jason Beaudoin from Weidmann volunteered for this section. The group will need to decide if the section should remain in the standard. Additional volunteers are needed.
 - i. Annex D – Bid Document Checklist section - No volunteers and open for chair to find volunteers. The group will need to decide if the section should remain in the standard.
 - j. New Section on High Temperature Insulation Application (including Fiber Optics) Section – Group agreed that there was a need for the section. Gilles Bargone from FISO and Emilio Morales from Qualitrol volunteered. Need additional assistance from manufacturers.
 - k. New Section on DGA Interpretation given some of the differences in hydrogen and acetylene generation – There was discussion on the need for this section; however, some participants were concerned with the scope was too large and the experts needed for this section are in other working groups that deal specification with DGA interpretation. Other participants stated that the existing interpretation guides are useful and applicable. It was determined to be too much for the working group to consider and therefore will not be accepted as a new section.
6. The chair will request from IEEE SA that the latest draft to be provided in the latest IEEE format and template. Then the chair will upload the current working draft to the IEEE Transformers Committee website.
7. The next working group meeting will be in Kansas City, MO during the Fall 2023 Transformers Committee Meeting.
8. The meeting adjourned at 12:00 CDT.

Attendance Record:**Status as of****3/30/2023**

	Last Name	First Name	Affiliation
Member	ALAHMED	ALEX	EVERGY
Guest	BARGONE	GILLES	FISO
Guest	BEAUDOIN	JASON	WEIDMANN
Guest	BINDER	WALLACE	WBBINDER CONSULTANT
Guest	BOETTGER	WILLIAM	BOETGER TRANSFORMER CONSULTING LLC
Member	CARRIZALES	JUAN ALFREDO	PROLEC-GE
Guest	CHAKRABORTY	ARUP	DELTA STAR INC
Guest	COKER	ANTHONY	M&I MATERIALS
Guest	COLOPY	CRAIG	CONSULTANT
Member	CORSI	DOMENICO	Doble Engineering Co.
Guest	DEBASS	SAMSON	EPRI
Guest	DOOR	JEFFREY	THE H-J FAMILY OF COMPANIES
Chair	DUGAN	ROGER	EPRI
Guest	GRIESACKER	BILL	WILLIAM GRIESACKER AND ASSOC.
Member	GUSTAUSSON	NIKLAS	HITACHI ENERGY
Guest	HIPCHEN	JOHN	COPPER DEVELOPMENT ASSOC.
Guest	KAPKA	SERGIUR	HITACHI ENERGY
Guest	KAZMIERCZAK	JERZY	HITACHI ENERGY
Guest	KENNEDY	SHELDON	NIAGARA TRANSFORMER
Guest	MORALES-CRUZ	EMILIO	QUALITROL
Guest	MUSGROVE	RYAN	OG&E
Guest	NEWBILL	MARK	HITACHI ENERGY
Guest	REHKOPF	SEBASTIAN	MR GERMANY
Member	SANDSTEN	LINA	HITACHI ENERGY
Guest	SAUER	DAN	EATON
Guest	SAWANT	ANIL	VIRIGINA TRANSFORMER
Guest	SNYDER	JASON	FIRST ENERGY CORP
Guest	SOM	SANJIB	PTTI
Guest	VARNELL	JASON	Doble Engineering Co.
Guest	VIERECK	KARSTEN	MR GERMANY
Member	WEYER	DANIEL	MONOLITH CORP
Member	WILLIAMS	TRENTON	ADVANCED POWER TECHNOLOGY
Guest	WHITTEN	CHRISTOPHER	HITACHI ENERGY

WG – C57.107
IEEE / PES Transformers Committee

Recommended Practice for Developing Short-Term Overexcitation V/Hz Curves for Transformers Directly
Connected to Generators

Tuesday, March 21, 2023, 1:45PM – 3:00PM, CDT
Hyatt Regency Milwaukee Regency B

Joe Watson – Chair Ramsis Girgis – Vice Chair Drew Welton – Secretary

The meeting started at 1:45PM.

There were 17 of 24 members and 34 guests present and signing the roster, allowing for a Quorum. Following the meeting 2 guests who requested membership were added as members.

The group unanimously approved the agenda and minutes of the Fall 2022 meeting that had been sent out to members and guests with the meeting notice.

The Patent and Copyright issues were discussed and no concerns were raised.

Chair's Remarks

The focus of the meeting was final resolution of the editorial and technical comments on the straw ballot for Draft 2 of the document. A summary of the comments was prepared by Drew Welton and presented by the chairman to the WG. The objective was to approve the final draft in preparation to submit to the subcommittee.

Areas of Discussion

There were 5 main areas of discussion.

Page 1, 1.1 Scope, line 8, For consistency and clarity, the phrase, "...duration increases in the voltage and/or frequency levels", was proposed to change to "...duration increases in the V/Hz ratio". This was unanimously approved by the group, pending approval of changing the scope. After discussions with IEEE SA, this will be modified to "...duration increases in the Voltage per Hertz (V/Hz) ratio."

Page 1, 1.2 Purpose, line 7,8 a change was recommended to include the word, "directly connected to generators." Unanimously approved by the group.

Page 4, Procedure for developing short-term overexcitation criteria for power transformers, lines 28-32, shall remain as stated.

In reference to recommended changes to update the references to NERC PRC-24-2 and other NERC documents, the group unanimously decided to remove the -2, as NREC will at times change the revision number, but should not affect the purpose of the reference for this document.

After some discussion, it was decided not to add general Transformer design formulas, or a new subsection on reducing the risk of failure due to overexcitation, to this document since the main purpose of the document is to specify a general technical procedure of producing the right V/Hz curves for a Transformer Design.

The WG voted unanimously to request approval from the PTSC to move the document, with the above noted editorial changes, to IEEE SA for MEC review and balloting.

New Business

A motion to form a comment resolution group was made by Ryan Hogg, and seconded by David Murry. The motion was unanimously approved.

Meeting Adjournment

A motion to adjourn the meeting was raised by Eduardo Garcia and seconded by Emilio Morales-Cruz. The meeting adjourned at 3:00 PM.

Next Meeting

The WG hopes to complete the balloting process before the next meeting, but we should plan on meeting in Kansas City to either summarize the ballot process or resolve any pending comment resolutions.

List of meeting attendees

Name	Affiliation	Status
Adams, Kayland	Prolec/GE	Member
Alahmed, Alex	Evergy	Guest
Alonso, Carlos H.	Arteche	Guest
Arritt, Bob	EPRI	Guest
Baldua, Juan Alfredo Carrizales	Prolec/GE	Guest
Bernesjo, Mats	Hitachi Powergrids	Member
Boettger, William	Boettger Transformer Consulting	Guest
Bratu, Lorin	Trench	Guest
Colopy, Craig	Retired	Guest
Cruz Valdes, Juan Carlos	Prolec/GE	Member
Dinh, Huan	Hitachi Energy	Member
Garcia, Eduardo	Siemens Energy	Member
Ghosh, Rob	Power System Asset Management Solutions	Guest
Girgis, Ramsis	Hitachi Energy	Co-chair
Gorzin, Ahreza	Black and Veach	Guest
Hernandez, Giovanni	Virginia Transformer	Member
Hogg, Ryan	Bureau of Reclamation	Member
Jensen, Nicholas	Delta-Star	Member
Joshi, Akash	Mott MacDonald	Guest
Kapka, Sergion	Hitachi Energy	Guest
Kerschenbauer, Christoph	Siemens Energy	Guest
Kessler, Stacey	Ulteig Engineers	Guest
Knapp, Evan	Eaton Corp.	Guest

Koshel, Anton	Delta-Star	Guest
Krvavac, Jusuf	Sargent and Lundy	Guest
Li, Weijun	Braintree Electric Light Department	Guest
Mani, Kumar	Duke Energy	Guest
Montanha, Juliano	Siemens Energy	Guest
Morales-Cruz, Emilio	Qualitrol	Member
Murray, David	Tennessee Valley Authority	Member
Newbill, Mark	Hitachi Energy	Guest
Patel, Sanjay Y.	Royal Smit Transformers	Member
Radu, Ion	Hitachi Energy	Guest
Rocque, Tim	Prolec GE	Guest
Sanchez, Albert	Knoxville Utilities Utilities	Guest
Sankarakurup, Dinesh	Duke Energy	Guest
Sarkar, Amitabh	VA Transformer	Member
Schrammel, Alfons	Siemens	Guest
Schweiger, Ewald	Siemens Energy	Guest
Speegle, Andy	Entergy	Guest
teNyenhuis, Ed	Hitachi Powergrids	Member
Thomas, Scott	Hitachi	Guest
Van Dreel, Cole	American Transmission	Guest
Veens, Jos	SGB-Smit	Guest
Watson, Joe	JD Watson and Associates	Chair
Webb, Bruce	Knoxville Utilities Board	Member
Webb, Matthew	GE	Guest
Welton, Drew	Intellirent	Secretary
White, Joe	Power Engineers	Guest
Yang, Fei	Hitachi Energy	Guest
Zamora, Omar Mendel	Prolec	Guest

Attachment K4.13

Task Force for Installation and Maintenance of Power Transformers C57.93

Tuesday, March 21, 2022

3:15 – 4:30 PM

Hyatt Regency

Milwaukee, WI

Chairman: Scott Reed

Vice Chairman: Alwyn VanderWalt

Secretary: Kyle Stechschulte

The meeting was called to order at 3:15 pm by Chair Scott Reed. This is the third meeting for this Task Force. The PAR for this Task Force expires 12/31/29

Chairman posted the Patent Claim and Copyright slides. No notifications or comments were received.

There were 63 guests in attendance. 10 of the 18 members were needed for a quorum. 11 members were present therefore a quorum was achieved. 11 guests, who attended fall 2022 and spring 2023 meetings, asked for membership and membership was granted after the TF meeting. 2 members have not attended Fall 2022 and Spring 2023 TF meetings and are therefore moved to guest status.

Niklas Gustavsson and Christopher Whitten presented on LTC inspection and maintenance. The presentation will be provided to the TF via the website. The flow chart table on the last slide was discussed as being incorporated into the maintenance portion of our document.

There was a discussion on the safety aspect of any maintenance activity we add to the guide, and whether qualified personnel are doing the work. The discussion to counter this argument was to keep any maintenance sections generic in nature and direct the audience to the appropriate OME manual.

There was discussion on removing the maintenance section since it is mostly covered by other standards such as C57.140. A few in the room suggested to leave the maintenance section in the guide and reference the other standards, or maintain the section and include more information.

There was a motion to accept the meeting agenda by Ewald Schweiger. Second was by Ryan Musgrove. The motion carried unanimously.

There was a motion to approve the fall meeting minutes by Evgenii Ermakov. Second was Mickel Saad. The motion carried unanimously.

There was a motion to adjourn at 4:30 p.m. by Brian Sparling. Second was Ewald Schweiger. The motion carried unanimously.

First name	Last name	Affiliation	Membership Status
Alex	Alahmed	Evergy	Guest
Greg	Anderson	GWAnderson & Assoc. Inc	Member

Vivek	Bhatt	Prolec GE	Guest (Membership Granted after meeting)
Wallace	Binder	WBBinder Consultant	Guest
Sanket	Bolar	Oncor	Guest
Samuel	Brodeur	Hitachi Energy	Guest
Jorge	Canto	Alliant Energy	Guest
Cole	Casey	Invenergy	Guest
Eanyoung	Cho	HICO America	Guest
Craig	Colopy	Retired	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Guest
Gabriel	Delgado Zamora	Invenergy	Guest
Paul	Dolloff	East Kentucky Power	Guest
Jesse	Duffy	Nashville Electric Service	Guest (Membership Granted after meeting)
Evgenii	Ermakov	Hitachi Energy	Member
Joe	Faherty	OTC Services	Guest
Marc	Foata	Reinhausen	Guest
Lorne	Gara	Shermco	Member
Eduardo	Garcia	Siemens-Energy	Guest
Brad	Grooms	NTS	Guest
Niklas	Gustavsson	Hitachi Energy	Member
Roger	Hayes	GE Grid Solutions	Guest (Membership Granted after meeting)
Jean Carlos	Hernandez	GT - NEETRAC	Guest (Membership Granted after meeting)
Ronald	Hernandez	Doble	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Derek	Hollrah	Burns & McDonnell	Guest
Ismail	Guner	Hydro Quebec	Guest (Membership Granted after meeting)
Nathan	Jacob	Camlin Energy	Guest
Christoph	Kerschenbauer	Siemens-Energy	Guest
Rafal	Kowalski	Hitachi Energy	Guest
Bernard	LaBean	Consumers Energy	Guest
Weijun	Li	Braintree Electric Light Dept	Guest (Membership Granted after meeting)
Mario	Locarno	Doble	Guest (Membership Granted after meeting)
Stephanie	Mabrey	Weidmann	Guest (Membership Granted after meeting)
Kumar	Mani	Duke Energy	Guest
Marian	Mohamed	xcel Energy	Guest
Ryan	Musgrove	OG&E	Member
Paul	Mushill	Ameren	Guest
Anthony	Natale	HICO America	Guest
Mark	Newbill	Hitachi Energy	Guest
Joe	Nims	Allen & Hoshall	Guest
Miguel	Plascencia	Pacific Gas & Electric	Guest
Uros	Plecevic	Invenergy	Guest

Daniel	Posadas	Prolec GE	Guest
John	Pruente	Prolec GE Waukesha	Guest
Bradley	Rainbolt	Eaton	Guest
Scott	Reed	MVA	Member
Perry	Reeder	GE	Member
Michael	Richardson	Ameren	Guest
Diego	Robalino	Megger	Guest
Patrick	Rock	American Transmission Co	Guest (Membership Granted after meeting)
Christopher	Rutledge	Dynamic Ratings	Guest
Mickel	Saad	Hitachi Energy	Member
Albert	Sanchez	Knoxville Utilities Board	Guest
Alaor	Scardazzi	Siemens-Energy	Guest (Membership Granted after meeting)
Ewald	Schweiger	Siemens Energy	Member
Steve	Shull	BBC Electgrical Service Inc.	Guest
Rich	Simonelli	Prolec	Guest
John	Sinclair	PPL Electric	Guest
Jason	Snyder	First Energy	Guest
William	Solano	Reinhausen	Guest (Membership Granted after meeting)
Brian	Sparling	Dynamic Ratings	Member
Tommy	Spitzer	City Transformer Service Co.	Guest
Bradley	Staley	Leeward Renewable Energy	Guest
Kyle	Stechschulte	AEP	Member
Charles	Sweetser	OMICRON electronics Corp USA	Guest
Troy	Tanaka	Burns & McDonnell	Guest
Olivier	Uhlmann	Reinhausen Canada	Guest
Matthew	Webb	GE	Guest
Daniel	Weyer	NPPD	Guest
Elliot	White	SDMyers	Guest
William	Whitehead	H2Scan	Guest
Christopher	Whitten	Hitachi Energy	Guest

Unapproved Meeting Minutes

PC57.153 TF Guide for Paralleling Regulating Transformers

Minutes from Spring 2023, Milwaukee Meeting

Officers

Chair – Mark Tostrud

Vice Chair – Cihangir Sen

Secretary – Zan Kiparizoski

1. Call to Order

The meeting was called to order at 4:45 PM on March 21,2023

2. Chairs Remarks

2.1 Essential Patent Claims

The Chair showed and briefly reviewed the IEEE SA slides related to the Essential Patent Claims. The Chair provided an opportunity to identify any patent related claim. No claims were made.

2.2 Copyright Policy

The Chair showed and briefly reviewed the IEEE slides related to Copyright Policy. There were no comments.

2.3 Participant Behavior

The Chair showed and briefly reviewed the IEEE slides related to participant behavior in the individual working group/task force process. There were no comments.

3. Attendance

- There were 25 attendees in the meeting
 - 7 members
 - 18 guest
 - 8 guests requested membership
- Quorum check
 - Quorum was achieved

4. Approval of the agenda and minutes from the last meeting

4.1. Proposed Meeting Agenda

- Welcome and call to order
- Distribution of sign-up rosters
- Call for Essential Patents
- Review of IEEE-SA Copyright policy
- Chairs Remarks
- Review and approval of the meeting agenda
- Review and approval of the minutes from the fall meeting
- Review results and comments from the straw ballot
- Old Business - None
 - Next Meeting(s)
 - Virtual meeting(s) - TBD
 - October 24, 2023 – Kansas City MO
- Adjourn

Motion was passed to approve the meeting agenda

- Motion – Markus Stank
- 2nd – Dan Sauer
- Unanimous approval

4.2 Approval of the minutes from the last meeting

Motion was passed to approve the minutes from the last meeting

- Motion – Markus Stank
- 2nd – Patrick Rock
- Unanimous approval

5. Old Business

The Chair reviewed the results of the straw ballot of the existing guide. 17 people responded on the straw ballot, 14 votes to approve no changes, 1 vote abstain and two ballotters provided comments:

Submitted Comments:

1. Is any interest to make this document dual logo IEEE/IEC document.
Discussion: Craig Colopy shared information about possibility of making the document a dual logo document. Markus Stank commented that IEC may not have interest of creating dual logo document but it is something it needs to be investigated.

2. Change “LTC” to “OLTC” throughout the document.
Discussion: IEEE/IEC Dual logo guides use OLTC. LTC was the appropriate term when the guide was approved in 2015. Working group will follow recommendation from Transformers Committee on whether LTC or OLTC should be used.
3. Update references to the current version of the standards. In many cases the standards which are referenced have been replaced with dual logo standards
4. Update language, figures, and diagrams in several places with content from the newer dual logo standards
5. Concept of Apparent Circulating Current in Annex C should be rewritten. Existing wording and equations could be simplified to make it easier to understand.
6. Add section which addresses paralleling transformers with reverse power flow.
Discussion: This wasn’t an issue when the guide was first developed but is something which users see on a regular basis today. A new section should be added to cover this topic. All attendees agreed this would be an improvement to the guide.

6. New Business

- The Chair called for a motion to request a PAR from the Power Subcommittee to revise the existing Guide for Paralleling Regulating Transformers
 - Motion – Dan Sauer
 - 2nd – Markus Stank

Discussion

Ryan Musgrove posed a question about the need to revise the document title, scope and purpose. Markus Stank elaborated the need of adding section for paralleling transformers with reverse power flow.

 - After short discussion the motion to approve was passed with unanimous vote.
- Motion was made the PAR for the revision document to have the same title as the existing document “Guide for Paralleling Regulating Transformers”.
 - Motion – Dan Sauer
 - 2nd – Patrick Rock
 - Unanimous approval
- The chair presented existing document scope, and motion was made to accept the existing document scope as the scope for the new document.
 - Motion – Dan Sauer
 - 2nd – Patrick Rock
 - Unanimous approval

- The chair presented existing document purpose, and motion was made to accept the existing document purpose as the purpose for the new document.
 - Motion – Markus Stank
 - 2nd – Dan Sauer
 - Unanimous approval

7. The meeting adjourned at 5:15 PM

This was the last TF meeting.

8. Minutes

The minutes were recorded by Zan Kiparizoski – Secretary and reviewed by Mark Tostrud – Chair

TF C57.153 – Participation List, Milwaukee Spring 2023			
Secretary	Zan	Kiparizoski	Howard Industries
Member	Ryan	Musgrove	Oklahoma Gas & Electric
Member	Patrick	Rock	American Transmission Company
Member	Dan	Sauer	Eaton
Vice-Chair	Cihangir	Sen	Duke Energy
Member	Markus	Stank	Reinhausen
Chair	Mark	Tostrud	Dunamic Ratings, Inc.
Guest	Kayland	Adams	Prolec GE
Guest	Edwin	Betancourt	Siemens Energy
Guest	Vivek	Bhatt	Prolec Energy
Guest	Michael	Butti	Hyogung Hico
Guest	Craig	Colopy	
Guest	Viereck	Ikarsten	Reinhausen
Guest	Stacey	Kessler	Ulteig-Engineers
Guest	Bernard	LaBean Jr.	Consumers Energy
Guest	Weijun	Li	Braintree Electric Light Dept.
Guest	Luis	Machain	Prolec GE
Guest	Kevin	Mazzei	Black & Veatch
Guest	Kent	Miller	
Guest	Francis	Mills	Power Engineers
Guest	Frank	Nedev	Trench
Guest	Ismael	Nojo	Eaton
Guest	Rodrigo	Ronchi	WEG Transformers
Guest	Yuri	Rossini	Siemens Energy
Guest	Marnie	Roussell	Entergy
Guest	Stefan	Schindler	Reinhausen
Guest	Brian	Sparling	Dynamic Ratings, Inc.
Guest	Mike	Spurlock	Spurlock Engineering Services
Guest	Jacob	Thielbar	WAPA

Standards Subcommittee

March 22, 2023, Milwaukee, WI

Standards Subcommittee		
Chair: Daniel Sauer	Vice-Chair: Marcos Ferreira	Secretary: Ajith Varghese
Standards Coordinator: Steve Shull		
Room: Regency C-D	Date: March 22, 2023	Time: 4:30 PM to 05:15 pm
Total Members: 71	Present at time of quorum check: 36	Attended per Record: 45
Guests present: 65	Membership requested: 7	Membership accepted: 3

L.1 Meeting Attendance

The Standards Subcommittee met on Wednesday; Mar 22nd, 2023, at 4:30 PM (CST).

36 members were in attendance at the beginning of the meeting, which met the quorum requirement.

Based on attendance roster and after correction to membership, it was confirmed that **45 of 71** members were present. 65 guests were also present of which **7** guests requested membership of which **3** met attendance requirement and will be granted membership.

L.2 Chair's Remarks

The Chair welcomed members and guests to the S23 meeting. Chair briefly highlighted the requirement that while introducing one need to state their affiliation.

The Agenda was moved by Eric Davis and seconded by Jerry Murphy. The motion was carried with unanimous consent. The Minutes for Fall 2023 was moved by Evgenii Ermakov and seconded by Steve Shull. The motion was carried with unanimous consent

Chair presented the IEEE requirement for patent and copyrights. The Chair reminded WGs that call of the patent is required 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

The Chair reminded the WG and TF leaders to submit their minutes from the meetings within **15 days** to the SC secretary. The SC Secretary then must submit the SC minutes within 45 days of the SC meeting. The Chair welcomed members and guests to the virtual meeting.

Chair briefly highlighted the requirement that while introducing one need to state their affiliation. Chair informed that Shankar Nambi is appointed as new chair for WG C57.12.80 to take over from Jim Graham, who had stepped down/retired.

WG on C57.12.00, C57.12.90, C57.12.80, C57.152 and C57.163 and TF on IEEE/IEC and Reverse Power flow provided an update on status of their standards/TF. Detailed WG/TF reports are included as part of this report.

- **WG C57.12.00:** Eric Davis reported PAR for next revision of C57.12.00 is approved by IEEE-SA and valid till 2026. WG is keeping a tab of activities in TF/WG for next revision. During S23, DTSC approved changes to Induce Test procedure and additional limits to Partial discharge. RLFT chair will forward approved text to WG
- **WG C57.12.90 Test Code:** Similar to C57.12.00, Test code was released in 2022 and PAR for next revision is also approved. During S23, in addition to changes to Induce/PD procedure (RLFT/DTSC), Temp rise TF (Insulation life SC) approved changes to changing wording ultimate to stabilized and added addition clarification how to report stabilized temperature.
- **WG C57.12.70 Terminal Markings:** Did not meet.
- **WG C57.12.80 Terminology Guide:** A motion was unanimously approved during F22 SC meeting to advance to IEEE SA for balloting. WG had discussion on definition of thermally upgraded paper
- **WG C57.152 Field guide:** During the Fall 2022 SC, a motion was unanimously approved to advance the guide to IEEE SA for balloting. However, a procedural error was made during the Fall 2022 WG meeting. During the meeting, the WG unanimously approved the work of the four WG Task Forces and approved the addition of their work to the draft. After that, a vote was taken to approve the draft of the standard and to send it to the Standards Subcommittee for approval. However, another email with the combined version of the draft should have been sent to the WG members for review prior to the approval vote, which made the vote to approve the draft of the standard invalid. The Chair and the Secretary thanked Mario for making the group aware of the error and promised to undertake the following actions to rectify it. The draft of the standard will be posted on the Committee website and sent by email to all members and guests.
- **WG C57.163 Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances:** Guide is in ballot resolution. Ballot got 81 % response rate and 97% approval. WG plan to recirculate and get the guide to IEEE before next meeting.
- **TF IEEE/IEC Cross Reference:** Allan Washburn, took over chair of this TF, which was inactive for some time and had their first meeting and discussed above creating a scoping document. Chair also reported previous work are not readily available and asked for support if any past documents are available. Ajith forwarded some work done in 2014 comparing C57.12.90 with IEC.
- **TF of Reverse Flow:** This was first meeting of this TF. Dan Blaydon and Ed made presentation and there was lot of interested. Some member noted that meeting time conflict with WG on paralleling guide and it will help to find time that work for both.

L.3 Working Group and Task Force Reports

L.3.1 Standards Working Group on the Continuous Revision of C57.12.00

Standards Working Group on the Continuous Revision of C57.12.00

Standards Subcommittee
IEEE/PES Transformers Committee
WG Chair: Eric Davis
Spring 2023 Milwaukee; March 22, 2023

INTRODUCTION

This is a working group by committee of task forces, for continuous revision of C57.12.00. 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. The WG exists administratively in the Standards Subcommittee, and the technical work is done in other subcommittees, based on expertise and scope. WG membership consists of the people actively working on revisions. These people are the TF Chairs, SC Chairs, and other significant contributors to the current version. This WG coordinates efforts with the companion standard C57.12.90 so that they publish together.

SUMMARY

C57.12.00-2021 was approved by IEEE SA Standards Board on November 9, 2021. and published January 2022. A Project Authorization Request (PAR) for Revision of PC57.12.00 was approved May 13, 2022. It expires December 31, 2026.

FUTURE REVISIONS AND PENDING WORK

Any new material provided by the various Task Forces to this WG for inclusion in the next revision, will first be approved by the responsible technical subcommittee (Dielectric Test, PCS, Distribution, IL, etc.) and then presented to the Standards Subcommittee for the "official" vote of approval to go to ballot.

Changes already approved for the next revision:

1. Changes to Low Frequency Tests from Ajith Varghese's RLFT TF in the Dielectric Test SC. Final survey approved by TF and SC in the Spring 2023 meeting. Text in black is existing, red is revised, blue is added.

5.10.5.5 Induced-voltage test for Class II power transformers

With the transformer connected and excited as it will be in service, an induced-voltage test shall be performed as indicated in Figure 2, at voltage levels indicated in Columns 6 and 7 and **1.05 times the line to ground voltage per column 2 of Table 4**. Minimum line-to-ground induced test levels for Class II power transformers shall be a multiple of corresponding line-to-ground nominal system

voltage as follows: 1.58 times for one-hour tests and 1.8 times for 7200 cycles enhancement level tests.

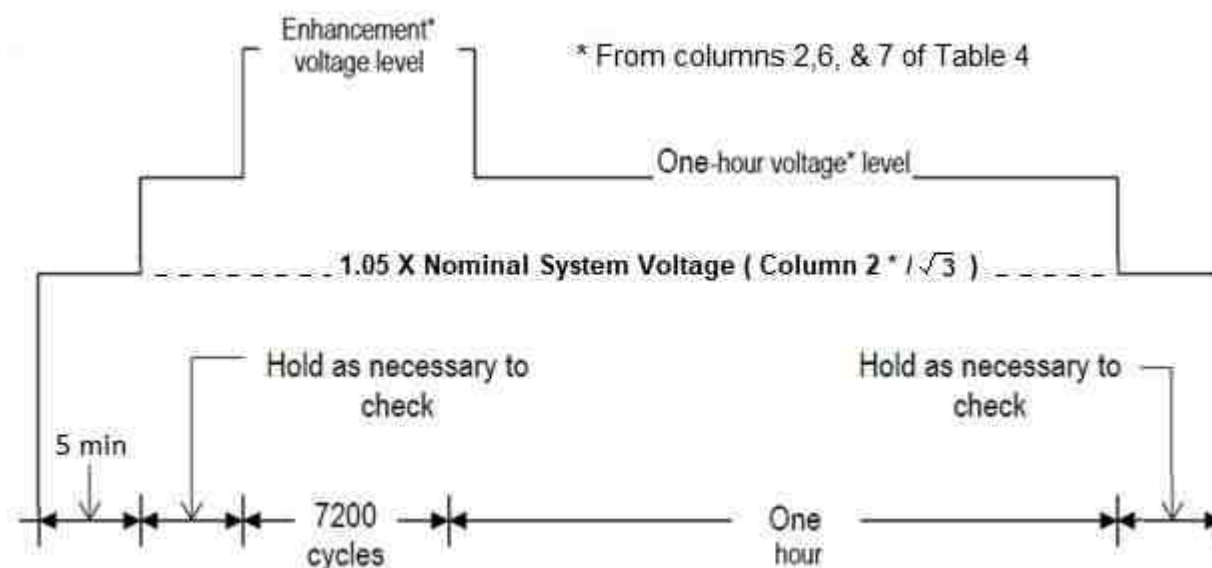


Figure 2 —Induced-voltage test for Class II power transformers

Respectfully submitted,
Eric Davis, WG Chair
March 26, 2023

L.3.2 WG Standard Terminal Markings and Connections for Transformers C57.12.70

WG on C57.12.70 did not meet during Spring 23 TC Meeting.

L.3.3 WG Standard Transformer Terminology for Transformers C57.12.80

WG on C57.12.80 did not meet during Fall 22 TC Meeting.

Document #: C57.12.80

Document Title:

Standard Terminology for Distribution and Power Transformers

Chair: Shankar Nambi Vice-Chair Weijun Li

Prev Chair:	<u>James Graham</u>	Secretary	<u>Richard von Gemmingen</u>
Current Draft Being Worked On:	<u>1.4</u>	Dated:	<u>NA</u>
Meeting Date:	<u>3/20/2023</u>	Time:	<u>9:30 AM – 10:45 AM</u>
Attendance:	Members		<u>11</u>
	Guests:		<u>22</u>
	Total		<u>33</u>

Meeting Minutes / Significant Issues / Comments:

New Chair, Shankar Nambi opened the meeting at 9:31 a.m. on Monday 20 March, 2023.

- 1) Quorum Check
- 2) Quorum was achieved with 11 of 13 members present. 22 non-voting participants also attended. Two Guests requested membership, (Saramma Hoffman and Vir Dharam). Saramma Hoffman was granted membership based on participation in previous meetings.
- 3) Approval of the Agenda
Dan Sauer moved to approve Agenda, Weijun Li seconded, and motion was unanimously approved.
- 4) Approval of the Fall 2022 minutes
Kris Zibert moved to approve the fall 2022 minutes, Dan Sauer seconded, and motion was unanimously approved.
- 5) Call for Essential Patents
A call for essential patents was made. No essential patents or issues were reported.
- 6) Copyright policy
The IEEE copyright policy was displayed and quickly reviewed. No issues were reported.
- 7) Status of Latest draft of C57.12.80-review changes since last meeting before sending for ballot
 - At fall meeting in Charlotte, the membership approved moving the document to ballot.
 - As preparation for this, Dan Sauer submitted draft 1.2 to MEC (Mandatory Editorial Coordination).
 - Dan Sauer indicated document did not have proper # sequences. He requested IEEE Edit board to update to current template and this was done after 2nd request. The version after this is 1.3.
 - Comments from MEC were incorporated in draft 1.4 which was the version displayed in the meeting.
 - Document needs to go to ballot by Fall 2023 as PAR expires December 2023.
 - PAR has already been extended for 3 years.
 - Dan Sauer made motion to authorize request for a 2nd PAR extension, Jeff Wright seconded. After short discussion it was agreed that a 1-year extension should be needed, and Ballot needs to be out before October 16. Motion was approved by unanimous consent.

- Comments on discussion for draft 1.4 Thermally upgraded paper definition
 - Thermally upgraded paper definition was in 2021 but some of it appeared to have been dropped. Action is to go back to Tom Prevost / C57.100 for confirmation of final definition.
 - Use of word “Shall” not to be used in notes. Propose to make changes to remove word “Shall”. Discussion was the word was copied directly from reference C57.100. Suggest change Note to normative number.
- Draft 1.4 does not have items for introduction. This is to be drafted by Shankar Nambi and sent to membership for comments.
- Draft 1.4 discussion on thermal rating factor for current transformer
 - Replace word “shall” with “should” in the informative note.
If note is removed and the statement is made part of definition, then “shall” can be used. This was discussed by Kris Zibert, Weijun Li, Ryan Musgrove.
 - Conclusion was modification to keep note and change “shall” to “should”. Weijun made motion to change “shall” to “should”, Dan Sauer seconded. The motion carried
 - Discussion continued with Dan Blaydon indication this seems to be outside scope of definition dictionary; suggested to reach out to C57.12.00 to find out where it came from, etc.
 - Voting was held, 9 votes to pass, 1 objection, and zero abstentions. Motion passed to replace “shall” with “should”.
- Draft 1.4 discussion on Watertight definition
 - Replace word “Shall” with “will”.
 - Dan Blaydon wanted to understand where this definition came from.
 - Richard von Gemmingen proposed to change “shall be” to “is”.
 - Dan Sauer moved to strike “shall be” and replace with “is”, Kris Zibert seconded.
Vote was taken with 8 approve, 0 objections, and 2 abstentions.
- Draft 1.4 discussion on statement 5 revised to remove year reference to document. No comments or discussion.
- Draft 1.4 MEC comments needed to have metrification. That is being taken care of.
 - Draft 1.4 Shankar Nambi will send draft to membership. All in attendance agreed.

8) Unfinished business – There was no unfinished business.

9) New Business – Sanjib Som discussed decision to remove note. This was agreed to be something for consideration in the next revision of document.

10) Weijun Li agreed to take on role of vice chair for the working group.

11) Adjournment. Dan Sauer made motion to adjourn, Kris Zibert seconded. Motion carried unanimously. Meeting adjourned at 10:20 AM

12) Next meeting – October 2023 in Kansas City

Submitted by: Richard von Gemmingen, Secretary

Date: 3/20/2023

Meeting Attendance List 3/20/2023

Name	Affiliation	S2023 Milwaukee BEFORE Status
Betancourt Enrique	Prolec GE	M
Blaydon Daniel	Baltimore Gas & Electric	G
Craven Michael	Qualus Power Services	G
Debass Samson	EPRI	G
Demir Yasm	Prolec GE	G
Dolloff Paul	East Kentucky Power	G
Gonzalez Luis	Conduct Industries Limited	G
Hall Michael	Mid Central Electric	G
Heiden Kyle	EATON Corporation	M
Hoffman Saramma	PPL Electric Utilities	G
Hogg Ryan	Bureau of Reclamation	G
Hopkins Traci	H2Scan Corporation	G
Jaroszy Patrycja	IEEE SA	G
Kapaka Sergiujz	Hitachi Energy	G
Kowalski Rafal	Hitachi Energy	G
Lambert Jason	JST Power	G
Li Weijun	Braintree Electric Light Dept	M
Lucas Tiffany	Prolec GE	G
Mai Tim-Felix	Siemens Energy	M
Matthews Lee	Howard Industries	M
Mills Francis	Power Engineers	G
Musgrove Ryan	Oklahoma Gas & Electric	M
Nambi Shankar	Bechtel Energy, Inc	M
Roussell Marnie	Entergy	G
Salahuddin Shatkh	Hitachi Energy	G
Sauer Daniel	Eaton Corporation	M
Som Sanjib	PTTI	G
Vir Dharam	Prolec-GE	G
vonGemmingen Richard	Dominion Energy	M

Name	Affiliation	S2023 Milwaukee BEFORE Status
Weyer Daniel	Monolith	G
Wright Jeffrey	Duquesne Light Co.	M
Zaman Malia	IEEE SA	G
Zibert Kris	Allgeier, Martin and Associates	M

L.3.4 WG Standards Transformer on Continuous Revision for C57.12.90

Standards Working Group on the Continuous Revision of C57.12.90

Standards Subcommittee

IEEE/PES Transformers Committee

WG Chair: Stephen Antosz

Vice-Chair/Secretary: Jason Varnell

Spring 2023 Milwaukee; March 22, 2023 (changes in red text)

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. The WG exists administratively in the Standards Subcommittee, and the technical work is done in other subcommittees, based on expertise and scope. WG membership consists of the people actively working on revisions. These people are the TF Chairs, SC Chairs, and other significant contributors to the current version. WG Members are:

Hakan Sahin
Ramsis Girgis
Sylvain Plante
Ajith Varghese
Diego Robalino
Dinesh Sankarakurup
Daniel Sauer
Rogerio Verdolin
Poorvi Patel
Sam Sharpless
Bertrand Poulin guest?
John Sen guest?
Polo Rodriguez guest?
Zan Kiparizoski guest?

Currently there are six Task Forces in three different Subcommittees, as follows:

1. PCS – Cont Rev to Test Code C57.12.90 Clauses 5-9, & 12, TF Chair: Hakan Sahin
2. PCS – Audible Sound Revision Clause 13, TF Chair: Ramsis Girgis
3. Dielectric Test – Cont Rev to Impulse Tests in Clause 10, TF Chair: **Sylvain Plante**
4. Dielectric Test – Cont Rev to LowFrequency Tests Clause 10, TF Chair: Ajith Varghese
5. Dielectric Test –Insulation Power Factor and Resistance, 10.10 and 10.11, TF Chair: Diego Robalino
6. Insulation Life – Cont Rev to Temperature Test Clause 11 and Resistance Clause 5, TF Chair: Dinesh Sankarakurup

SUMMARY

C57.12.90-2021 was approved as a revised standard by the IEEE-SA Standards Board on Nov 9, 2021. It was published on Feb 4, 2022. The WG Chair took out a new PAR on Feb 28, 2022, which was approved by the IEEE-SA Standards Board on May 13, 2022. **The PAR expires on December 31, 2026.**

FUTURE REVISIONS AND PENDING WORK

Any new material provided by the various Task Forces to this WG 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 to go to ballot.

Changes already approved for the next revision:

1. Hakan Sahin’s PCS TF for Revision of C57.12.90.

- a. Changes to subclause 7.3, Ratio test methods to “modernize” it. Final survey approved in the Spring 2021 virtual meeting.

Insert a new subclause 7.3.1 as follows:

7.3.1 Electronic ratio and phase measurement meters

An electronic meter that determines the transformer turns ratio, polarity and phase angle may be used for the measurement of these parameters.

The existing 7.3.1 Voltmeter method should be renumbered to be 7.3.2, are no changes to the text.

The existing 7.3.2 Comparison method should be renumbered to be 7.3.3, no changes to the text or figures 10 & 11.

The existing 7.3.3 Ratio meter clause and figure 12 is to be deleted.

- b. Ratio test voltage and frequency under subclause 7.1.2. Request to change frequency bandwidth. TF and SC approved in Spring 2022.

7.0 Ratio test

Current Version:

7.1.2 Voltage and frequency

The ratio test shall be made at rated or lower voltage and rated or higher frequency.

Revised Version

7.1.2 Voltage and frequency

The ratio test shall be made at rated or lower voltage and be such that the ratio of test voltage to test frequency is less than or equal to the ratio of rated voltage to rated frequency.

- c. Number of short-circuit tests under subclause 12.3.4. TF and SC approved in Spring 2022.

Current Version:

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.

Revised Version

12.3.4 Number of tests

- When a three-phase transformer is tested in a three-phase test circuit or in a single-phase test circuit as given in Annex C, each phase of the transformer shall be subjected to three tests satisfying the asymmetrical current requirements specified in 12.3.3. The tests shall be performed on one of the outer phases with the tap-changer in the maximum position, on the

- other outer phase with the tap-changer in the minimum position and on the middle phase with the tap-changer in the principal position
 - When a single-phase transformer is tested in a single-phase test circuit the transformer shall be subjected to three tests satisfying the asymmetrical current requirements specified in 12.3.3. The three tests shall be performed one each, with the tap-changer in the maximum, minimum and principal position.
- d. Load Tap Changer performance test with rated voltage. New subclause 8.7. TF and SC approved in Spring 2022. It was re-discussed in Fall 2022 but no changes were made so still considered to be approved.

8.7 Load Tap Changer Voltage Test

8.7.1 General

In order to verify the performance of a transformer that has a load tap changer (LTC), the LTC shall be operated through one end-to-end-to-end sequence (from one tap extreme to the other tap extreme and back again) with the transformer energized at rated voltage.

8.7.2 Control voltage

Control voltage for the LTC motor during the test shall be as near to rated voltage as possible, with a minimum of 85%.

8.7.3 Preparation for the test

The LTC shall be fitted with all included equipment. It shall be connected as it will be in service, including protective devices.

8.7.4 Procedure

Either the high or low voltage winding of the transformer under test shall be energized at rated voltage and frequency, unless otherwise specified. The LTC shall be operated using the motor drive but not manual rotation. The LTC shall be operated through all tap positions twice, starting at one tap extreme and progressing to the other tap extreme, and then return back again to the original tap position. The test may be performed at intervals, if necessary, such as to adjust the test circuit for the applied voltage to be adjusted to the rated voltage of the tap position, but it is a requirement that the transformer be energized at no less than rated voltage corresponding to each tap to be changed.

8.7.5 Observations and Analysis

8.7.5.1 Audible Sound

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. With some types of tap changers, there will be abnormally loud sounds if components are not assembled properly. Note that during operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

8.7.5.2 Supply Test Circuit

The test control system shall be monitored for any trip of the test circuit that automatically stops the circuit from keeping the transformer energized.

8.7.5.3 Dissolved Gas-in-Oil Analysis

Oil samples shall be taken from the LTC 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.

8.7.6 Failure Detection and Acceptance Criteria

The transformer will have passed this LTC Voltage test if:

- The tap changer operates normally with no abnormal sound
- The transformer stays energized without a trip in the supply test circuit
- For mineral oil filled vacuum LTCs, the increase of the sum of H₂, CH₄, C₂H₆, C₂H₄ and C₂H₂ should not exceed 12 ppm for in-tank type LTCs and 6 ppm for compartment type LTCs.
- For non-vacuum type LTCs, or LTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.

- e. Load Tap Changer performance test with rated current. New subclause 9.6. TF and SC approved in Spring 2022. It was re-discussed in Fall 2022 but no changes were made so still considered to be approved.

9.6 Load Tap Changer Current Test

9.6.1 General

In order to verify the performance of a transformer that has a load tap changer (LTC), the LTC shall be operated through one end-to-end-to-end sequence (from one tap extreme to the other tap extreme and back again) with the transformer current flowing through the windings, corresponding to the top nameplate MVA rating.

9.6.2 Control voltage

Control voltage for the LTC motor during the test shall be as near to rated voltage as possible, with a minimum of 85%.

9.6.3 Preparation for the test

The LTC shall be fitted with all included equipment. It shall be connected as it will be in service, including protective devices.

9.6.4 Procedure

The test shall be performed by applying a short circuit either the high-voltage winding or the low-voltage winding and applying sufficient voltage across the other winding to cause a specific current to flow in the windings. The LTC shall be operated using the motor drive but not manual rotation. The LTC shall be operated through all tap positions twice, starting at one tap extreme and progressing to the other tap extreme, and then return back again to the original tap position. The test may be performed at intervals, if necessary, such as to adjust the test circuit for the applied voltage to be adjusted to the required current of the tap position, but it is a requirement that the transformer be energized at no less than 80% of the top MVA nameplate current value for each tap change.

9.6.5 Observations and Analysis

9.6.5.1 Audible Sound

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. With some types of tap changers, there will be abnormally loud sounds if components are not assembled properly. Note

that during operation of the change-over selector (reversing switch or coarse-tap selector) the sound can be slightly different.

9.6.5.2 Supply Test Circuit

The test control system shall be monitored for any trip of the test circuit that automatically stops the circuit from keeping the transformer energized.

9.6.5.3 Dissolved Gas-in-Oil Analysis

Oil samples shall be taken from the LTC 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.

9.6.6 Failure Detection and Acceptance Criteria

The transformer will have passed this LTC Voltage test if:

- The tap changer operates normally with no abnormal sound
- The transformer stays energized without a trip in the supply test circuit
- For mineral oil filled vacuum LTCs, the increase of the sum of H₂, CH₄, C₂H₆, C₂H₄ and C₂H₂ should not exceed 12 ppm for in-tank type LTCs and 6 ppm for compartment type LTCs.
- For non-vacuum type LTCs, or LTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.

2. Changes to Insulation Power Factor test, from Diego Robalino's Diel Test SC TF for Winding Insulation Power Factor. Final survey approved in the Fall 2021 virtual meeting and by DielTest SC Jan 2022. Specifically with regards to Subclause 10.10.2 revising the accuracy requirements of instrumentation.

The existing text is:

10.10.2 Instrumentation

The insulation power factor may be measured by special bridge circuits or by the voltampere-watt method. The accuracy of measurement should be within $\pm 0.25\%$ insulation power factor, and the measurement should be made at or near a frequency of 60 Hz.

The revised text to replace it will be:

10.10.2 Instrumentation

The insulation line-frequency power factor or dissipation factor may be measured by special bridge circuits or by the voltampere-watt method. The accuracy of the measurement instrumentation at or near rated frequency should be:

- for Insulation Power Factor Below 1%: $\pm 2\%$ of reading $\pm 0.05\%$ absolute
- for Insulation Power Factor Above 1%: $\pm 5\%$ of reading $\pm 0.05\%$ absolute

3. Changes to Clause 11 Temperature Test, from Dinesh Sankarakurup's TF in the Insulation Life SC.

- a. Changes to subclause 11.3.2, Liquid Temp Rise Determination. Final survey approved by TF and SC in the Spring 2023 meeting. In the first paragraph change the word “ultimate” to “stabilized”, and add a sentence that the top oil rise shall not be averaged over time. Text in black is existing, red is revised, blue is deleted.

Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ~~ultimate~~ **stabilized** temperature rise above ambient shall be considered to be reached when the top liquid temperature rise does not vary more than 2.5% or 1 °C, whichever is greater, during a consecutive 3 h period. **The stabilized liquid temperature rise determined at the end of the total loss run shall not be averaged over time.**

4. Changes to Audible Sound from Ramsis Girgis’ TF in the Perf Char SC. These changes were approved by the TF at Spring 2023, but not by the Perf Char SC. **The SC should review by email prior to or in-person at the next meeting.** Text in black is existing, red is revised, blue is deleted.

- a. Changes to 13.3.3.1 No-load audible sound level.

When a transformer is equipped with a tap changer, the transformer may, on certain tap changer positions, produce sound levels that are higher than the audible sound level at the rated tap position. For these transformers, the measurements ~~shall may, upon purchaser request, and as agreed upon,~~ be made with the transformer on the highest sound producing tap position.

Also, other excitation conditions may occur in service leading to lower, or higher, **core noise**. For example, transformers designed to operate with variable flux the core audible sound level is strongly impacted by the tapping position. **The same is true for SVC transformers when connected to a capacitive load;** Again, for these transformers, the measurements ~~shall may, upon purchaser request, and as agreed upon,~~ be made with the transformer operating at the highest sound producing condition.

- b. Changes to 13.5.5.1 Measuring ambient sound pressure level.

~~The ambient sound pressure level shall be established by averaging the ambient sound pressure levels measured immediately preceding and immediately following the sound measurements with the transformer energized. The ambient sound shall be measured at a minimum of four locations, and the instruments shall be in conformance with 13.2.~~ **The ambient sound pressure level shall be measured at a minimum of four locations around the transformer immediately preceding and immediately following the sound measurements with the transformer energized. The ambient sound pressure level shall be established by calculating the logarithmic average of measured values of the ambient sound pressure levels. The measuring instruments shall be in conformance with 13.2. However, additional measurements may be made if agreed to by the manufacturer and purchaser or if the ambient measurements vary by more than 3 dB around the transformer. ...**

- c. Changes to 13.3.3.2 Load audible sound level.

Since load audible sound becomes a contributor to the total audible sound of the transformer at higher loads, the load audible sound level shall be measured at the ONAF measuring contour. **For transformers with only an ONAN rating, load noise is to be measured at the ONAN sound measuring contour.**

5. Changes to Low Frequency Tests from Ajith Varghese’s RLFT TF in the Diel Test SC. Final survey approved by TF and SC in the Spring 2023 meeting. Text in black is existing, red is revised, blue is deleted.

a. Changes to Induced Test for Class II, Clause 10.8.2 PD Test Procedure

10.8.2 Test procedure

The voltage shall first be raised from zero to the 1.05 X line to ground value of the nominal system voltage (column 2, C57.12.00 Table 4) and held long enough to attain a stable partial discharge level and then record the level of partial discharge. The voltage shall then be raised to the one-hour level and held for a minimum of 5 min or until a stable partial discharge level is obtained to verify that there are no partial discharge problems. The partial discharge level shall be measured at the end of the 5 min period. If the 5 min. period at the 1 h voltage level is extended to obtain a stable partial discharge level the partial discharge shall be measured at the end of this period so that the level of partial discharges are 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 one-hour 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.

Immediately following the 1 h period, the voltage shall then be reduced to 1.05 X line to ground value of the nominal system voltage (column 2, C57.12.00 Table 4) and held until a stable partial discharge level is obtained and the partial discharge level measured.

b. Changes to Induced Test for Class II, Clause 10.8.5 PD Failure Detection.

10.8.5 Failure detection

Failure may be indicated by the presence of smoke and bubbles rising in the insulating liquid, an audible sound such as a thump, or a sudden increase in the test current. Any such indication shall be carefully investigated by observation, by repeating the test, and by other diagnostic tests to determine whether a failure has occurred. In terms of interpretation of partial discharge measurements, the results shall be considered acceptable and no further partial discharge tests required under the following conditions:

- a) The magnitude of the partial discharge level does not exceed 250 pC during the 1 h test period.
- b) The increase in partial discharge levels during the 1 h period does not exceed 50 pC.
- c) The partial discharge levels during the 1 h period do not exhibit any steadily rising trend, and no sudden sustained increase in the levels occurs during the last 20 min of the test.
- d) The magnitude of partial discharge level at 1.05 X Nominal System Voltage following the 1 h test period does not exceed 100 pC.

PENDING WORK

Since this is a continuous revision document, there is ongoing work in Task Forces.

- 1. Possible revisions from Hakan Sahin's PCS TF for Revision of C57.12.90. As of March 22, 2023 there is only one item of business related to Clause 5 and determining the temperature used for measuring cold resistance.
- 2. Possible changes to Clause 13 sound test from Ramsis' TF. No open items.

3. Possible changes to Subclause 10.2 or 10.3 from Sylvain Plante's TF regarding switching and lightning impulse tests. The TF has the following items on its agenda and is working on possible revisions:
 - 10.3.2.2, 10.3.2.3, 10.4.4, 10.4.5 impulse tests on transformers with series-multiple and delta-wye connections. This was discussed, survey done and slight changes made. **A final version is imminent.**
 - Establishing guidelines about use of +/-3% tolerance on voltage peak. Draft wording was presented and discussed. **A final version is imminent.**
 - Proposal regarding phase-to-phase switching impulse. **This work is ongoing.**
4. Other possible revisions to subclauses 10.5 to 10.10 from Ajith Varghese's TF for revision of low frequency tests.
 - Class I transformer PD test revision to the test procedure by Don Ayer's sub Task Force. **This work is ongoing.**
 - Venting bushings during PD test, lots of discussion, this is a controversial topic, some proposed wording exists as a starting point but a small group will work to revise, need collaboration with bushing manufacturers, transformer manufacturers, and users who all have different viewpoints. **This work is ongoing.**
5. Possible changes to subclause 10.11 from Diego Robalino's TF regarding insulation resistance. **This work is ongoing.** Possible future changes to insulation resistance measurement procedures are being considered, as compared to conflicting procedures in other documents such as C57.152. Also, possible future addition of core megger and clamp megger procedures since none currently exist in 12.90.
6. Changes to Clause 11 Temperature Test from Dinesh Sankarakurup's TF
 - 11.4.3 Add text that reverse correction for altitude is also allowed; i.e., when factory is located above 1000 m and transformer rating is based on <1000m. **This work is ongoing in a small subgroup and is almost complete.**
 - Request for clarification for temp test of 3-winding transformers, injecting maximum losses, and correcting for maximum common winding current in autos. **This work is ongoing.**
 - Proposal by Bertrand Poulin OFAF Cooling and Top Duct Oil temperature and diagram in C57.119. **This work is ongoing.**
 - Clarification to Hottest spot Rise calculation using Fiber Optics
 - Standardize Method for Hot resistance extrapolation

Respectfully submitted,
 Stephen Antosz, WG Chair
 Jason Varnell, WG Vice-Chair
~~March 23, 2023, Rev 0~~
 March 26, 2023, Rev 1 Added final text
 10.8.2 & 10.8.5 to Ajith's TF

L.3.5 WG Standards Transformer on Revision for C57.152, Guide of Field Tests

*Standards Subcommittee,
WG – C57.152 Revision
IEEE / PES Transformers Committee*

*March 20, 2023, 11:00AM – 12:15PM
UNAPPROVED MINUTES*

Welcome

The chair of the working group, Marcos Ferreira, and the secretary, Goran Milojevic, opened the meeting at 11:00AM.

1. Attendance and Attendance for Quorum

At the time of the meeting there were 42 Members, including Chair and Secretary. A total of 28 members were counted as present at the meeting. 71 members and guests signed into the circulating paper roster.

28 members present of 42 mean requirements for quorum were fulfilled. The list of attendees is shown below:

Name	Affiliation	Status
Ferreira, Marcos	Bridgeview LLC	Chair
Milojevic, Goran	DV Power	Secretary
Bradshaw, Jeremiah	US Bureau of Reclamation	Member
Colopy, Craig	Consultant	Member
Dutta Roy, Samragani	Siemens Energy	Member
Ermakov, Evgenii	Hitachi Energy	Member
Foata, Marc	Maschinenfabrik Reinhausen	Member
Gara, Lorne	Shermco	Member
Guner, Ismail	Hydro Quebec	Member
Gustavsson, Niklas	Hitachi Energy	Member
Harley, John	First Power Group	Member
Hayes, Roger	General Electric	Member
Heiden, Kyle	EATON Corporation	Member
Herron, John	Raytech USA	Member
Lejay, Olivier	Huaming USA Corp.	Member
Locarno, Mario	Doble Engineering Company	Member
Mabrey, Stephanie	Weidmann	Member
Mayer, Robert	Siemens Energy	Member
Melle, Thomas	Highvolt	Member
Murray, David	TVA	Member
Parminder, Panesar	Virginia Transformer Corporation	Member
Poorvi, Patel	EPRI	Member
Robalino, Diego	Megger	Member
Saad, Mickel	Hitachi ABB Power Grids	Member
Sweetser, Charles	OMICRON Electronics Corp USA	Member
Tanaka, Troy	Burns & McDonnell	Member
teNyenhuys, Ed	IEEE	
Woods, Deanna	Alliant Energy	Member

Bernesjo, Mats	Hitachi Energy	Guest
Betancourt, Edwin	Siemens Energy	Guest
Boettger, William	Boettger Transformer Consulting	Guest
Canto, Jorge	Alliant Energy	Guest
Casey, Cole	Invenergy	Guest
Cross, James	Kinetrics	Guest
Delgado, Gabriel	Invenergy	Guest
Dillon, Nikolaus	Dominion Energy	Guest
Duffy, Jesse	Nashville Electric Service	Guest
Eun Young Cho	HICO America	Guest
Forsyth, Bruce	Bruce Forsyth and Associates	Guest
Gupta, Ravi	Megger	Guest
Gyore, Attila	M&I Materials	Guest
Kerschenbauer, Christoph	Siemens Energy	Guest
Knappek, Will	Omicron Electronics	Guest
LaBean, Bernard	Consumers Energy	Guest
Li, Chao	EATON	Guest
Lopes Mamede, Gabriel	Siemens Energy	Guest
McBride, Jim	JMX High Voltage	Guest
Mellin, Toni	Vaisala	Guest
Mills, Francis	Power Engineers	Guest
Natale, Anthony	HICO	Guest
Nims, Joe	Allen & Hoshall	Guest
Patel, Rakesh	Hitachi Energy	Guest
Plecevic, Uros	Invenergy	Guest
Pruente, John	Prolec GE	Guest
Powell, Chris	Intermountain Electric	Guest
Rehkopf, Sebastian	Maschinenfabrik Reinhausen	Guest
Rock, Patrick	American Transmission Company	Guest
Sahin, Hakan	Virginia Transformer Corporation	Guest
Scardazzi, Alaor	Siemens Energy	Guest
Shaikh, Abdulmajid	Delta Star	Guest
Shaikh, Salahuddin	Hitachi Energy	Guest
Snyder, Jason	First Energy	Guest
Speegle, Andy	Entergy	Guest
Spitzer, Tommy	City Transformer	Guest
Tolcachir, Eduardo	TTE	Guest
Uhlmann, Olivier	Reinhausen	Gues
Vir, Dharam	Prolec-GE	Guest
Washburn, Alan	Burns & McDonnell	Guest
White, Elliot	SD Myers	Guest
Whitten, Christopher	Hitachi Energy	Guest

2. Approval of the Agenda

The motion to approve the agenda was made by Wallace Binder, and seconded by Evgenii Ermakov. The motion was approved unanimously.

3. Approval of Minutes of Fall 2022 Meeting

The motion to approve the Minutes of Fall 2022 Meeting was made by Jeremiah Bradshaw, and seconded by Evgenii Ermakov. The motion was approved unanimously.

4. Call for Patents

The chair presented slide 1-4, dated January 2, 2018 informing of the IEEE patent policy and participants duty to inform. There were no issues related to patent assurance brought up by attendees in the meeting.

5. IEEE Copyright Policy

The chair presented IEEE-SA Copyright Policy slides 1-2 informing the audience of the policy.

6. Chair's Remarks

The chair, Marcos Ferreira, gave the following remarks.

“Our vice chair, Mr. Peter Werelius, has informed us of his resignation from his position as Vice Chair of this Working Group. We want to thank Peter for his work and his contributions. Therefore, the remaining work to be done by the chair and secretary due to late stage of completion the current revision.

During the last meeting, the proposed draft of the standard was accepted unanimously by the present members of this Working Group. The work on obtaining copyright permissions from all copyright holders for new material that was added to the standard is currently ongoing, as part of preparation for submission of a clean version to the Mandatory Editorial Committee (MEC). Comment Resolution Board Members were formed between meetings.

Thank you.

Marcos Ferreira, Chair of WG.”

Discussion

During the show of the membership roster, Stephanie Mabrey pointed out that certain previous members have retired, and certain errors in the email list which was maintained manually. The Secretary took note and promised to rectify these errors.

During discussion after the Chair's Remarks, Mario Locarno pointed out that a procedural error that was made during the Fall 2022 meeting. During the meeting, the WG unanimously approved the work of the four WG Task Forces, and approved the addition of their work to the draft. After that, a vote was taken to approve the draft of the standard and to send it to the Standards Subcommittee for approval. However, another email with the combined version of the draft should have been sent to the WG members for review prior to the approval vote, which made the vote to approve the draft of the standard invalid.

The Chair and the Secretary thanked Mario for making the group aware of the error, and promised to undertake the following actions to rectify it.

- The draft of the standard will be posted on the Committee website and sent by email to all members and guests.
- Email balloting of WG members to approve the draft of the standard will be performed between meetings.
- If the draft is approved, it will be sent to the Standards Subcommittee for email balloting and approval between meetings.
- The Chair will apply for PAR extension to avoid potential issues with PAR expiration at the end of 2023.

7. New Business

No new business this time.

8. Meeting Adjournment

The meeting was adjourned at 11:40AM

Respectfully submitted,

Marcos Ferreira – Chair

Goran Milojevic – Secretary

L.3.6 WG PC57.163 IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances

PC57.163 - WG for the Revision of IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances

3:15 PM to 4:30 PM Eastern Time, March 21, 2023 (Milwaukee, WI)

Unapproved Meeting Minutes

The WG Chair Dan Blaydon presided over this meeting with both the Vice-Chair, Ramsis Girgis, and Secretary, Scott Digby, in attendance. Meeting attendance numbers as follows:

Total Attendance	72 (see listing at the end of this report)
Members in Attendance	21 (out of 37 members, quorum achieved)
Guests in Attendance	51
Guests Requesting Membership	0

Guests Requesting Membership (attendance at 2 out of 3 meetings required to qualify for membership): As the document had been previously approved by the Working Group for sponsor ballot, in accordance with clause 4.1 of the WG P&P manual new membership requests are not able to be accepted.

The requisite patent and IEEE-SA copyright policy slides were reviewed, with no items noted. The agenda was reviewed by the Chair and approved by unanimous consent. The minutes from the Fall-2023 meeting had been circulated along with the proposed agenda prior to the meeting. There were no changes to the Fall-2023 meeting minutes requested and they were approved by unanimous consent.

With the document currently going thru the Balloting process, the Chair provided a review of the project milestones, history, and status, noting that the PAR expires December-2024. The Chair reported that Balloting closed March 2, 2023, with an 81% return rate, 97% approve rate, and 65 comments. Of the comments 48 were editorial, 9 were technical, and 8 were general, with 17 being categorized as “Must Be Satisfied”. The Chair reported that the Comment Resolution Group (CRG) that had been formed as approved at the Fall-2022 WG meeting has been actively working on disposition for each comment received, will be incorporating the changes based on the comments into the Draft document as appropriate, and that once completed there will be a 10-day Ballot Recirculation of the updated Draft, likely in early April. In this Ballot recirculation, the full balloting group has the right to examine the revisions to the document resulting from the comments and determine whether they want to maintain / change their vote. The need for balloter to vote again is needed only in case of changing the original vote. The Public Review period had not yet closed, but no comments had been received from that process to date. The WG Officers will continue to move the document through the remaining IEEE processes toward publication.

There were no old business items to address.

There were no new business items raised.

Given the status of the ballot process for the revised document it is expected that this was the last meeting of this WG, so no WG meeting is planned during the Fall-2023 Transformers Committee meetings.

The meeting adjourned prior to the 4:30 pm end time of the designated meeting time slot.

Respectfully Submitted,

Scott Digby, WG Secretary

Role	First Name	Last Name	Affiliation
Chair	Daniel	Blaydon	Baltimore Gas & Electric
Vice-Chair	Ramsis	Girgis	Hitachi Energy
Secretary	Scott	Digby	Duke Energy
Member	Mats	Bernesjo	Hitachi Energy
Member	William	Boettger	Boettger Transformer Consulting LLC
Member	Hakim	Dulac	Advanced Power Technologies
Member	Bill	Griesacker	Duquesne Light Co.
Member	Saramma	Hoffman	PPL Electric Utilities
Member	Dmitriy	Klempner	Southern California Edison
Member	Martin	Munoz Molina	Orto de Mexico
Member	Sanjay	Patel	Smit Transformer
Member	Ion	Radu	Hitachi Energy
Member	Markus	Schiessl	SGB
Member	Eric	Schleismann	Southern Company Services
Member	Sanjib	Som	Pennsylvania Transformer
Member	Marc	Taylor	JFE Shoji Power Canada Inc.
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Member	Alan	Washburn	Burns & McDonnell
Member	Joe	Watson	JD Watson and Associates Inc.
Member	Trenton	Williams	Advanced Power Technologies
Member	Waldemar	Ziomek	PTI Transformers
Guest	Kayland	Adams	SPX Transformer Solutions, Inc.
Guest	Thomas	Aikens	Virginia Transformer
Guest	Bob	Arritt	EPRI
Guest	Enrique	Betancourt	Prolec GE
Guest	Susan	Bonfiglio	Western Area Power Admin.
Guest	Elizabeth	Bray	Southern Company
Guest	Juan Alf..	Carrizabi	Prolec GE
Guest	Camilo	Casallas	Trench LTD
Guest	Arup	Chakraborty	Delta Star Inc.
Guest	Michael	Craven	Qualus Power Services
Guest	Daniel	Crockett	Ameren
Guest	Samson (Sami)	Debass	EPRI
Guest	Nikolaus	Dillon	Dominion Energy
Guest	Roger	Dugan	EPRI
Guest	Ken	Fedor	SMIT Transformatoren B.V.
Guest	Castro	Fidel	SDGE
Guest	Raymond	Frazier	Ameren
Guest	Hector	Garza	Orto deMexico
Guest	Jeffrey	Gragert	Xcel Energy
Guest	Corey	Hanson	Advanced Power Technologies
Guest	Akash	Joshi	Mott MacDonald
Guest	Viereck	Karsten	MR
Guest	Shelton	Kennedy	Niagara Transformer
Guest	Anton	Koshel	Delta Star Inc.
Guest	Krysztol	Kulasek	Delta Star Inc.
Guest	JOSE LUIS	MACHAIN	PROLEC GE
Guest	Lee	Matthews	Howard Industries
Guest	Omar	Mendez Zamora	Prolec GE
Guest	Emilio	Morales-Cruz	Qualitrol Company LLC
Guest	Marta	Munoz	Hitachi
Guest	David	Murray	Tennessee Valley Authority
Guest	Stephen	Oakes	WEG Transformers USA Inc.
Guest	Homero	Portillo	Advanced Power Technologies
Guest	Ulf	Radbrandt	Hitachi Energy
Guest	Sebastian	Renkopf	MR
Guest	Tim	Rocque	Prolec GE Waukesha

Guest	Rodrigo	Ronchi	WEG
Guest	Marnie	Roussell	Entergy
Guest	Amitabh	Sarkar	Virginia Transformer
Guest	Alfons	Schrammel	Siemens Energie
Guest	Jonathan	Snodgrass	Texas ABM University
Guest	Markus	Stank	Maschinenfabrik Reinhausen GmbH
Guest	Andy	Steineman	Delta Star Inc.
Guest	Scott	Thomas	Hitachi
Guest	Cole	Van Dreel	American Transmission Company
Guest	Jos	Veens	SMIT Transformatoren B.V.
Guest	Dharam	Vir	Prolec GE Waukesha Inc
Guest	Bruce	Webb	Knoxville Utilities Board
Guest	Joe	White	Power Engineers
Guest	Jeffrey	Wright	Duquesne Light Co.
Guest	Guang	Yuan	Hitachi

L.3.7 TF - IEEE / IEC Continuous Cross Reference

Standards Subcommittee Task Force
IEEE / IEC Cross Reference
Monday, March 20, 2023, 9:30am to 10:45am
Chair: Alan Washburn

1. Welcome
 - a. Meeting came to order at 9:35am
2. Introduction of participants
 - a. 12 attendees
3. IEEE SA patent policy and call for patents – none noted
4. IEEE SA copyright policy – no comments
5. Membership review
 - a. Meeting was approached as a new effort as it is being restarted
 - b. Anyone interested in membership was admitted
 - c. Quorum was achieved
6. Review /approval of agenda
 - a. Agenda was approved
7. Review of F19 Minutes
8. Old business
 - a. S20 presentation
9. New business
 - a. Presentation topics
 - i. Most recent previous meeting minutes focused on having regular presentations on detailed comparison topics. Attendees were requested to submit any future topic recommendations.
 - b. Index document
 - i. The majority of discussion was around determining the scope of the TF work, including putting some additional effort into finding previous documents or other information produced by the TF.
 - ii. Attendees recommended developing a written description of our scope and requesting feedback from the Subcommittee.

- iii. There was some discussion that a more formalized work product could be of interest, possibly shared in some way so that it could be publicly available.
 - iv. May start initially with an index that simply lists cross reference information by topic.
 - v. One attendee mentioned that adding cross reference information to CIGRE documents in the future may provide additional benefits.
 - c. Meeting frequency
 - i. TF will continue to meet at both spring and fall committee meetings.
- 10. Adjourn
 - a. Meeting adjourned.

L.3.8 TF Reverse Power Flow

Minutes of Meeting Task Force – Reverse Power Flow Milwaukee, WI – Mar 21, 2023

- The Working Group met at 16.45 in the Executive Ballroom at the Hyatt Regency Hotel on Mar 21, 2023. This was the first meeting of the TF.
- The Chair, Dan Blaydon (Baltimore Gas & Electric), led the meeting; The Secretary, Ed teNyenhuis (Hitachi Energy), recorded the attendance and meeting minutes.
- There was 69 persons requesting membership and 52 guests for 121 total attendees.

First Name	Last Name	Affiliation	Member	Guest
Elise	Arnold	SGB	X	
Javier	Arteaga	Hitachi Energy	X	
Gilles	Bargone	FISO Technologies Inc.	X	
Mats	Bernesjo	Hitachi Energy	X	
Enrique	Betancourt	Prolec GE	X	
Daniel	Blaydon	Baltimore Gas & Electric	X	
William	Boettger	Boettger Transformer Consulting LLC	X	
David	Calitz	Siemens Energy	X	
Fidel	Castro	SDGE	X	
Thomas	Dauzat	AEP	X	
Nikolaus	Dillon	Dominion Energy	X	
Jose	Gamboa	H-J Family of Companies	X	
Eduardo	Garcia Wild	Siemens Energy	X	
James	Gardner	SPX Transformer Solutions, Inc.	X	
Carlos	Gaytan	Prolec GE	X	
Jeffrey	Gragert	Xcel Energy	X	
Bill	Griesacker	W. Griesacker and Associates	X	
Kenneth	Hampton	Baltimore Gas & Electric	X	
Corey	Hanson	Advanced Power Technologies	X	
Roger	Hayes	General Electric	X	
Carlos	Hernandez	Delta Star	X	
Jean	Hernandez	Neetrac - Georgia Tech	X	
Ronald	Hernandez	Doble Engineering Co.	X	
Saramma	Hoffman	PPL Electric Utilities	X	
Nicholas	Jensen	Delta Star Inc.	X	
John	John	Virginia Transformer Corp.	X	
Christopher	Johnson	Oncor	X	
Akash	Joshi	Black & Veatch	X	
Jerzy	Kazmierczak	Hitachi Energy	X	

Qasim	Khan	Neetrac - Georgia Tech	X	
Dmitriy	Klempner	Southern California Edison	X	
Mark	Lachman	Doble Engineering Co.	X	
Junho	Lee	Hyundai Electric	X	
Kumar	Mani	Duke Energy	X	
Daniel	Mulkey	Mulkey Engineering Inc.	X	
Dwight	Parkinson	EATON Corporation	X	
Monil	Patel	Pacific Gas & Electric	X	
Sanjay	Patel	Smit Transformer	X	
Vinay	Patel	Consolidated Edison Co. of NY	X	
Tim	Rocque	Prolec GE	X	
Dinesh	Sankarakurup	Duke Energy	X	
Amitabh	Sarkar	Virginia Transformer Corp.	X	
Anil	Sawant	Virginia Transformer Corp.	X	
Markus	Schiessl	SGB	X	
Eric	Schleismann	Southern Company Services	X	
Pugal	Selvaraj	Virginia Transformer Corp.	X	
Jaber	Shalabi	VanTran Industries, Inc.	X	
Hemchandra	Shertukde	University of Hartford	X	
Avijit	Shingari	Pepco Holdings Inc.	X	
Christopher	Slattery	FirstEnergy Corp.	X	
Sanjib	Som	Pennsylvania Transformer	X	
James	Spaulding	Fort Collins Utilities	X	
Arthur	Speegle	Entergy Services, Inc.	X	
Markus	Stank	Maschinenfabrik Reinhausen	X	
Ali	Syed	Comed	X	
Ed	teNyenhuis	Hitachi Energy	X	
Scott	Thomas	Hitachi Energy	X	
Eduardo	Tolcachir	Tubos Trans Electric S.A.	X	
Mark	Tostrud	Dynamic Ratings, Inc.	X	
Cole	Van Dreef	American Transmission Co.	X	
Jason	Varnell	Doble Engineering Co.	X	
Dharam	Vir	Prolec GE	X	
Pragnesh	Vyas	Sunbelt-Solomon Solutions	X	
Joe	Watson	JD Watson and Associates Inc.	X	
Joe	White	Power Engineers	X	
Fei	Yang	Hitachi Energy	X	
Guang	Yuan	Hitachi Energy	X	
Michael	Zarnowski	Carte International	X	
Peter	Zhao	Hydro One	X	
Shaikh	Abdulmajid	Delta Star		X
Stephen	Antosz	Stephen Antosz & Associates, Inc		X
Kush	Arora	Maschinenfabrik Reinhausen		X
Barry	Beaster	H-J Family of Companies		X
Jason	Beaudoin	Weidmann Electrical Technology		X
Duvier	Bedoya	Hitachi Energy		X
Kevin	Biggie	Weidmann Electrical Technology		X
Jeremiah	Bradshaw	Bureau of Reclamation		X
Chris	Brown	SDGE		X
Juan Alfredo	Carrizales	Prolec GE		X
Vivian	Chan	Hitachi Energy		X
Rhett	Chrysler	ERMCO		X
Craig	DeRouen	ERMCO		X
Scott	Digby	Duke Energy		X
Fernando	Duarte	EPRI		X
Roger	Dugan	EPRI		X
Qusai	Elnimri	Vantran		X
Sanford	Fong	Georgia Power Co.		X
Raymond	Frazier	Ameren		X
Lorne	Gara	Shermco		X
Miguel	Garcia	Hitachi Energy		X
John	Herron	Raytech USA		X
Nathan	Jacob	Camlin Energy		X
Gary	King	Howard Industries		X
Anton	Koshel	Delta Star Inc.		X
Krzysztof	Kulasek	Delta Star		X
Andrew	Larison	Hitachi Energy		X
So-young	Lee	Hyundai Electric		X
Aleksandr	Levin	Weidmann Electrical Technology		X
Lee	Matthews	Consultant		X
Omar	Mendez Zamora	Prolec GE		X

Timothy	Menter	Lincoln Electric System		X
Michael	Morgan	Duke Energy		X
Hugo	Murillo	H-J Family of Companies		X
Anthony	Natale	HICO America		X
Joe	Nims	Allen & Hoshall, Inc.		X
Bertrand	Poulin	Hitachi Energy		X
Thomas	Prevost	Weidmann Electrical Technology		X
Jarrold	Prince	ERMCO		X
Martin	Rave	ComEd		X
Robert	Reepe	Georgia Power Co.		X
Michael	Richardson	Ameren		X
Albert	Sanchez	Knoxville Utilities Board		X
Salahuddin	Shaikh	Hitachi Energy		X
Jason	Snyder	First Energy		X
Brad	Staley	Leenward Renewable Energy		X
Alan	Traut	Howard Industries		X
Reinaldo	Valentin	Duke Energy		X
Jos	Veens	SMIT Transformatoren B.V.		X
Joshua	Verdell	ERMCO		X
Bruce	Webb	Knoxville Utilities Board		X
Zachery	Weiss	WEG Transformers USA Inc.		X

- The Chair introduced the TF objectives which are to evaluate the effect of reverse power flow and identify which standards or WG's are likely to be impacted.
- Dan Blaydon presented a DER case with a solar farm connected to a 1950's step down transformer. There was flow in both directions due to: the solar farm feeding the system, the solar farm feeding the load or the grid feeding the load.
- Dan Blaydon presented specific sections of historical and current transformer standards which refer to step-up and step-down operation.
- Ed teNyenhuis presented various transformer winding arrangements (two winding, two winding with LTC, auto connected and multi winding) and the possible impacts due to reverse power flow. The main points for existing transformers are:
 - Power flow changes should be reviewed for all affected transformers
 - System study can predict the new reverse power flow loading scenarios
 - May need to be reviewed by the transformer OEM (they know the winding arrangement and can recalculate leakage flux)
 - Nameplate Loading might have to be decreased
 - Restrict power factor of the reverse power flow
 - In worst case, transformer life can be significantly reduced with reverse power flow
- The below comments were given by the TF:
 - Each case of reverse power flow is reviewed separately
 - New transformers are specified to be step up and step down
 - Common to have solar farm and battery together
 - DER load can be on or off in an instant
 - Sound level of the transformer could be increased (due to core over fluxing)
 - GSU's can also be in step down operation (VAR's can be coming from the system)

- Decommissioned power plants are often converted to battery storage with old GSU in step down operation
 - Transformers in reverse power flow experience many more LTC operations
 - User needs to specify what are the loading conditions for the manufacturer to consider
 - Need to consider the VAR's for reverse power flow as well
 - Will the TF consider both power and distribution transformers?
 - The 110% overvoltage required in IEEE standards should cover all cases of reverse power flow
 - The TF should outline what are the issues to consider for reverse power flow
- The Chair requested that the TF members each consider presenting cases of reverse power flow experiences for next meeting
- The meeting was adjourned at 18.00

L.4 Old Business

There was no old business to discuss.

L.5 New Business

No new business was brought up for discussion before or during the meeting.

L.6 Attendance

Included as last two pages of this minutes.

L.7 Adjournment

The meeting was adjourned at 5:15 PM CST.

Respectfully submitted,
Ajith M. Varghese
Standards SC Secretary
04/22/2023

Standards SC S23 Attendance List

Role	First Name	Last Name	Company	3/20/2023
Guest	Abdul Majid	Shaikh	Delta Star Inc.	X
Secretary	Ajith	Varghese	Prolec GE Waukesha	X
Member	Akash	Joshi	Black & Veatch	X
Guest	Alan	Washburn	Burns & McDonnell	X
Guest	Alex	Alahmed	Evergy	X
Member	Amitabh	Sarkar	Virginia Transformer Corp.	X
Guest	Anand	Zanwar	Siemens Energy	X
Guest	Anton	Koshel	Delta Star Inc.	X
Guest	Arup	Chakraborty	Delta Star Inc.	X
Guest	Bernard	Labeau	Consumers Energy	X
Guest	Bertrand	Poulin	Hitachi ABB Power Grids	X
Member	Bill	Griesacker	Duquesne Light Co.	X
Member	Brad	Staley		X
Member	Bruce	Forsyth	Bruce Forsyth and Associates	X
Guest	Carlos	Gaytan	Prolec GE	X
Guest	Charles	Sweetser	OMICRON electronics Corp U	X
Guest	Christopher	Johnson	Oncor	X
Guest	Christopher	Slattery	FirstEnergy Corp.	X
Guest	Christopher	Whitten	Hitachi Energy	X
Guest	Cole	Van Dree	American Transmission Co	X
Guest	Craig	Colopy		x
Member	Daniel	Blaydon	Baltimore Gas & Electric	x
Chair	Daniel	Sauer	EATON Corporation	X
Guest	Daniel	Posadas	Prolec SA	X
Guest	David	Wallach	Duke Energy	X
Guest	Derek	Hollrah	Burns & McDonnell	X
Member	Dharam	Vir	ProlecGE Waukesha	X
Guest	Dinesh	Sankarakurup	Duke Energy	X
Guest	Dmitriy	Klempner	SCE	X
Member	Drew	Welton	Intellirent	x
Member	Dwight	Parkinson	EATON Corporation	x
Member	Ed	teNyenhuus	Hitachi ABB Power Grids	x
Member	Eduardo	Garcia Wild	Siemens Energy	x
Member	Egon	Kirchenmayer	Siemens Energy	x
Guest	Emilio	Morales-Cruz	Qualitrol Company LLC	x
Guest	Enrique	Betancourt	Prolec GE	X
Member	Eric	Davis	Burns & McDonnell	x
Member	Evgenii	Ermakov	Hitachi ABB Power Grids	x
Guest	Fei	Yang	Hitachi ABB Power Grids	X
Guest	Francis	Mills	Power Engineers	x
Guest	Goran	Milojevic	DV Power	x
Guest	Grace	Guang Yuan	Hitachi	X
Member	Hemchandra	Shertukde	University of Hartford	X
Guest	Ion	Radu	Hitachi ABB Power Grids	x
Guest	Ismael	Naga	EATON Corporation	X
Guest	Jacob	Thielbar	WAPA	X
Member	Jarrold	Prince	ERMCO	X
Member	Jeffrey	Wright	Duquesne Light Co.	X
Guest	Jeremiah	Bradshaw	Bureau of Reclamation	x
Member	Jerry	Murphy	Reedy Creek Energy Services	x
Guest	Jesse	Duffy	Nashville Electric Service	X
Guest	Joe	White	Power Engineers	X
Member	John	Herron	Raytech USA	x
Member	John	John	Virginia Transformer Corp.	x

Role	First Name	Last Name	Company	3/20/2023
Member	Joseph	Tedesco	Hitachi ABB Power Grids	x
Member	Joshua	Yun	Virginia Transformer Corpora	x
Guest	Juan Alfredo	Carrizales	Prolec GE	x
Member	Juan Carlos	Cruz Valdes	Prolec GE	x
Guest	kayland	Adams	ProlecGE Waukesha	X
Guest	Kumar	Mani	Duke Energy	x
Member	Kurt	Kainerder	Siemens Energy	x
Guest	Lus	Gonzalex	Conduct	X
Vice-Chair	Marcos	Ferreira	Beale AFB	x
Guest	Mark	NewBill	Hitachi	X
Guest	Mark	Tostrud	Dynamic Ratings, Inc.	x
Member	Michael	Botti	Hyosung HICO	x
Guest	Michael	Richardson	Ameren	X
Guest	Miguel	Garcia	Hitachi Energy	X
Guest	Miguel	Plascencia	PGE	X
Guest	Monil	Patel	Pacific Gas & Electric Compan	x
Guest	Moonhee	Lee	Hammond Power Solutions	x
Guest	Nick	Jensen	Delta Star Inc.	x
Guest	Nikolaus	Dillon	Dominion Energy	x
Member	Philip	Hopkinson	HVOLT Inc.	X
Guest	Pragnesh	Vyas	Sunbelt-Solomon Solutions	X
Guest	Qasim	Khan		X
Member	Ramadan	Issack	American Electric Power	X
Guest	Raymond	Frazier	Ameren	x
Guest	Rehan	Ali	Siemens Energy	X
Guest	Richard	vonGemmingen	Dominion Energy	x
Member	Rob	Ghosh	General Electric	x
Member	Robert	Ballard	DuPont	x
Guest	Robert	Reepe	Georgia Power Co.	X
Guest	Roberto Ignacio	Da Silva	Cargill	X
Guest	Ryan	Musgrove	Oklahoma Gas & Electric	x
Guest	Ryan	Hogg	Bureau of Reclamation	x
Guest	Salahuddin	Shaikh	Hitachi ABB Power Grids	X
Guest	Samson	Debass	EPRI	x
Guest	Sanford	Fong	Georgia Power Co.	X
Member	Sanjib	Som	Pennsylvania Transformer	x
Member	Saramma	Hoffman	PPL Electric Utilities	x
Member	Scott	Digby	Duke Energy	x
Member	Scott	Reed	MVA	x
Guest	Scott	Thomas	Hitachi Energy	x
Member	Sergio	Hernandez Cano	Hammond Power Solutions	x
Guest	Stacey	Kessler	Ultieg Eng	X
Member	Stephen	Antosz	Stephen Antosz & Associates	x
Member	Stephen	Shull	BBC Electrical Services, Inc.	x
Member	Steven	Snyder	Hitachi ABB Power Grids	x
Guest	Susan	Bonfiglio	Western Area Power Admin.	x
Member	Tauhid Haque	Ansari	Hitachi ABB Power Grids	x
Member	Thomas	Dauzat		x
Guest	Tim	Rocque	ProlecGE Waukesha	X
Member	Tim-Felix	Mai	Siemens Energy	x
Guest	Vijay	Tendulkar	Eaton	x
Guest	Vivian	Chan	Hitachi	X
Guest	Vivek	Bhatt	ProlecGE Waukesha	x
Member	Weijun	Li	Braintree Electric Light Dept.	x
Guest	William	Boettger	Boettger Transformer Consu	x
Member	William	Whitehead	Siemens Energy	x

Subsurface Transformers and Network Protectors Subcommittee Minutes

Chairman: _____ **George Payerle** _____ **Vice-**

Chair: _____ **Tony Reiss** _____

Meeting Date: March 22, 2023 **Location:** Milwaukee, WI **Time:** 11:00 – 12:15

Meeting Administration:

- Sign In - 2 rosters, 1 from the front and 1 from the back
- Chairman's Comments
 - Invite to Memberplanet has gone out - 1 profile per person no matter how many groups you are involved with. 1 primary e-mail as well and secondary and tertiary
 - Will allow for lists again. Should be active in the fall but rosters will still be used for the foreseeable future.
 - Bruce Forsythe would like WG chairs to consider individuals who have been key contributors so they can be recognized in the future
 - WG training was downgraded from required to optional
 - Reminder that going to ballot prior to PAR expiration will help get PAR extensions - shows group is actively working
- Quorum Determination, member list
 - Show of hands that 24 members were in attendance - 18 required for quorum.
- Present agenda for approval
 - Motion by Brian Klaponski to accept, 2nd by Dan Mulkey - Accepted Unanimously
- Approval of the Fall 2022 minutes
 - Motion by Mike Zarnowski to accept, 2nd by Al Trout - Accepted Unanimously
- Announce new members as of S23
 - None announced
- Does anyone request SC membership? Indicate on roster.

Working Groups Report:

Subsurface Transformers and Network Protectors Subcommittee Minutes

- **C57.12.23 Single-Phase Submersible Transformers** working group –
- **NOT MEETING AT THIS TIME**
Alan Traut, Chairman,
 - Revision due date: 12/31/2028
 - PAR Approval Date:
 - PAR Expiration Date:

Stage:

Subsurface Transformers and Network Protectors Subcommittee Task force / Working Group Report

Presented by Al Trout -Al plans to have a PAR study group meeting at F23 and plans to submit a PAR request in Spring of 2024. Doesn't appear that PAR scope needs to be changed unless there were objections. None were stated during the meeting. Al said to reach out if needed after the meeting.

- **C57.12.24 Three-Phase Submersible Transformers** working group –
Ben Garcia, Chairman; Tom Dauzat, Vice Chair; George Payerle, Secretary
 - Approved: **12/7/2016**
 - Revision Due Date: 12/31/**2026**
 - PAR Approval Date:
 - PAR Expiration Date: **12/31/23 in ballot resolution**

Stage: Recently Approved

IEEE/PES Transformers Committee Working Group Three-Phase Submersible Transformers (C57.12.24) **Meeting Minutes** Hyatt Regency Hotel, Milwaukee, WI Monday, March 20, 2023

Members Present

Nabi	Almeida	Prolec GE
Piotr	Blaszczyk	Specialty Transformer Comp.
David	Blew	Retired
John	Chisholm	IFD Corporation
Douglas	Craig	Richards Manufacturing Co.
Thomas	Dauzat	AEP Swepco
William	Elliott	AEP Swepco
Benjamin	Garcia	Southern California Edison
John	Harley	FirstPower Group LLC
Ramadan	Issack	American Electric Power
Alejandro	Macias	CenterPoint Energy
Kent	Miller	T&R Electric Supply Co.
Daniel	Mulkey	Mulkey Engineering Inc.
Vinay	Patel	Consolidated Edison Co. of NY
George	Payerle	Carte International Inc.
Jarrold	Prince	ERMCO
James	Ratty	Electronic Technology Inc.
Pedro	Salgado	Electronic Technology Inc.
Avijit	Shingari	Pepco Holdings Inc.

Subsurface Transformers and Network Protectors Subcommittee
Task force / Working Group Report

James	Spaulding	Fort Collins Utilities
Christopher	Sullivan	Westmark Partners
Alan	Traut	Howard Industries
John	Vartanian	National Grid
Michael	Zarnowski	Carte International
Guests Present		
Brian	Baumann	Cargill, Inc.
Sanford	Fong	Georgia Power Co.
Miguel	Garda	Hitachi Energy
Hector	Garza	Orto de Mexico
Michael	Gonzalez	Southern California Edison
Carlos	Hernandez	Delta Star
Traci	Hopkins	H2Scan
Jason	Lambert	JST Power
Martin	Munoz Molina	Orto de Mexico
Hugo	Murillo	H-J Enterprises
Tyler	Parenti	Cargill, Inc.
Daniel	Posadas	Prolec-Celeco
Clemens	Reiss IV	Custom Materials, Inc.
Christopher	Rutledge	Dynamic Ratings, Inc.
Fernando	Salinas	Power Partners
Stefan	Schindler	Maschinenfabrik Reinhausen
Jeremy	Sewell	Quality Switch, Inc.
Russell	Sewell	Quality Switch, Inc.

The S23 meeting for C57.12.24 was called to order at 4:45 pm in the Milwaukee room of the Hyatt Regency in Milwaukee. Introductions were made. The meeting achieved quorum with 24 of 39 members present plus 18 guests.

The chair presented the meeting's agenda. Mike Zarnowski made a motion to accept the agenda and Alex Macias seconded; approval was unanimous.

The chair presented the minutes for the Fall 2022 meeting in Charlotte. Tom Dauzat made a motion to accept the minutes as presented and Nabi Almeida seconded; approval was unanimous.

The chair presented the patent and copyright slides. No patent issues were brought up.

The chair thanked the comment resolution team for their help. Then proceeded to review comments made on the standard, starting with editorial comments. While reviewing an editorial change on lines 215 and 216, the IEEE Liaison advised the Chair that if column T is being "ACCEPTED" that column U should be blanked out. The WG also advised the chair that only non-editorial comments needed to be reviewed.

Subsurface Transformers and Network Protectors Subcommittee

Task force / Working Group Report

The following technical changes from Draft 11 were discussed and accepted by the WG.

- **Line 321:** The sentence *“Except as modified in this standard, transformer terminology found in IEEE Std C57.12.80 shall apply”* was requested by the reviewer to be removed from the document since no definitions were being modified. The chair asked the WG if they wanted to keep or delete it. The WG decided to keep the language in lines 321/322 just in case it was needed in the future. The WG rejected this comment.
- **Line 339:** A comment was made by a reviewer to consider revising wording from section “5.2 Kilovolt-ampere ratings” of C57.12.24 to be more consistent with published wording from section “5.2 Kilovolt-ampere ratings” of C57.12.23. The WG decided to stick with the wording in C57.12.24 from Draft 11 and not make any changes to this section. The WG rejected this comment.
- **Line 346:** C57.105 was referenced on line 346 (Section 5.2 of Draft 11) but was not listed in the Normative Reference section. The WG will add C57.105 to the Normative Reference section between lines 313 and 314. The standard will be listed as follows: *“IEEE Std C57.105TM, IEEE Guide for Application of Transformer Connections in Three-Phase Electrical Systems.”* The WG accepted this comment.
- **Line 350:** Draft 11 showed footnote “4” at the end of Note 1, Table 1. However, no corresponding footnote description was detailed at the bottom of the page. Footnote “4” from the published 2016 revision stated, *“Notes in text, tables, and figures are given for information only and do not contain requirements needed to implement the standard.”* After reviewing this statement with the WG, it was decided to just delete footnote “4”. The WG accepted a revised version of this comment.
- **Line 350:** A commenter suggested that the WG add phase-to-neutral voltages for each grounded-wye voltage listed in Table 1/Column 1 for consistency within the document. The WG discussed changing e.g. 22 860 to 22 860GrdY/13 200 but decided that for clarity purposes not make that change. The WG rejected this comment but suggested to revisit it during the next PAR revision.
- **Line 368:** During balloting, a comment was made to consider revising wording from “6.2 Reference Temperature” in C57.12.24 to match “5.5 Reference Temperature” published in C57.12.23. The WG decided to leave Section 6.2 as shown in Draft 11 as-is; no changes will be made at this time. The WG rejected this comment but suggested to revisit it during the next PAR revision.
- **Line 370:** A commenter suggested that only SS 316 be called for in 7.0 Construction. The group felt manufacturers/users should be given flexibility on material selection based on needs of the customer. The WG rejected this comment, the chair will work with D. Mulkey to revise wording on the spreadsheet.
- **Line 458:** Commenter suggested that the WG add the word “de-energized” before “tap changer.” Line 458 will now read *“If a **de-energized** tap changer is specified, each tap changer position and the associated tap voltage shall be clearly identifiable by reference to nameplate information.”* The WG accepted this comment.
- **Line 464:** Commenter suggested that the WG add the word “de-energized” before “primary taps” in the heading of Table 6. The group decided this was an unnecessary change since the heading of Section 7.3.1, where Table 1 resides is titled “De-energized Tap Changer.” The WG rejected this comment.

Subsurface Transformers and Network Protectors Subcommittee
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- **Line 567:** Commenter suggested that the WG add the word “rectangular” between the words “long axis of the” and “transformer.” The entire sentence will now read “*The transformer base structure shall consist of bars parallel to the long axis of the **rectangular** transformer.*” The WG accepted this comment.
- **Line 645:** The commenter suggested that the WG remove the reference to IEEE 386 in the bibliography (lines 645 and 646) since this information already resides in the Normative reference section (lines 300 and 301). The WG accepted this comment.
- **Line 543:** The commenter suggested that the WG consider revising wording in section “7.5.2 Tank Integrity” from Draft 11 to wording published in C57.12.39 section “4.2.1 Tank Integrity.” The WG decided to delete all wording from section 7.5.2 in Draft 11 and replace it with “*Requirements for nominal pressure, tank integrity, and rapid transient pressure, including design tests for fault current capability, are defined and shall be in accordance with IEEE Std C57.12.39.*” The WG accepted a revised version of this comment. This wording was provided to the WG by the chair of C57.12.20 and is consistent with is published in their standard.
- **Line 622:** The commenter suggested that the WG consider replacing wording in C57.12.24 Annex A with wording from C57.12.39 Annex B.3. The WG decided to maintain wording from C57.12.24 Draft 11. The WG rejected this comment.
- **Line 552:** Based on the change from line 543 above, the entire text from section 7.5.2 will be deleted except for “*Requirements for nominal pressure, tank integrity, and rapid transient pressure, including design tests for fault current capability, are defined and shall be in accordance with IEEE Std C57.12.39.*” The WG accepted a revised version of this comment.

The following general changes from Draft 11 were discussed and accepted by the WG.

- **Line 220:** The reviewer requested that 2009 revision information be placed back into the standards introduction section. The chair said he will add that information back, but a comment from the WG suggested that the old information could be and should be deleted. The WG agreed to not restore the old information. The WG rejected this comment.
- **Line 273:** The chair discussed the use of the terms “High Voltage” and “Low Voltage” as opposed to “Primary Voltage” and “Secondary Voltage” in the title and scope of C57.12.24. For the purposes of this publication cycle, the WG decided to leave the wording as-is. The WG rejected this comment, however they suggested that a task force be created between the Distribution Transformer and STNP sub-committees to harmonize wording across all impacted standards.
- **Line 442:** A reviewer asked whether Table 5 should include stud size along with the number of spade holes for kVA sizes 750-3750kVA. The WG rejected this comment.
- **Line 611:** A reviewer asked why line 611 includes a reference to C57.12.90 when line 612 is Table 8 which lists “Audible Sound Levels.” The WG stated that the mention of C57.12.90 was the reference that details how to do these tests and is required. The WG rejected this comment.

Subsurface Transformers and Network Protectors Subcommittee

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- **Line 611:** A reviewer asked the WG to add "...and in accordance with C57.12.00" into the draft. The WG agreed with the proposed change. Line 611 will not read *"Sound levels shall not exceed values detailed in Table 8, the transformer shall be connected and energized in accordance with IEEE Std. C57.12.00 and tested in accordance to IEEE Std. C57.12.90."* The WG accepted a revised version of this comment.

Dan Mulkey moved to accept all technical and general changes discussed at this meeting. Paul Chisholm seconded the motion. The motion was approved unanimously by the WG.

The chair will update the redline and send the ballot out for recirculation ASAP.

The chair asked the WG to allow the comment resolution team permission to resolve non-technical comments in the future re-balloting. There were no objections.

The WG suggested the chair request a 2-year PAR extension for safety. The chair agreed and will do so.

The chair stated that if things go well, we probably won't meet in Kansas City. Meeting was adjourned at 5:45 pm.

Respectfully Submitted by: Ben Garcia, Chairman C57.12.24 Working Group

C57.12.40 Secondary Network Transformer working Group –

John Vartnian, Chairman, Dan Schwartz, Secretary

- Published 2017
- Revision due date: **12/31/2027**
- PAR Approval Date: 8/31/2012
- PAR Expiration Date: **12/31/2023, PAR extension pending**

Stage: Submitted to Revcom on RevCom Agenda 04-May-2017

IEEE Transformers Committee

C57.12.40

Secondary Network Transformer Working Group

Subsurface Transformers and Network Protectors Subcommittee
Task force / Working Group Report
Spring 2023 Charlotte Meeting Minutes
Hyatt Regency, Milwaukee, WI
Lakeshore Ballroom (1)

11:00 AM CST March 21, 2023

Members Present

John Vartanian (Chair)
Dan Schwartz (Secretary)
Nabi Almeida
Piotr Blaszczyk
Dave Blew
Douglas Craig
Tom Dauzat
William Elliott
Mark Faulkner
Brian Klaponski
Alex Macias
Dan Mulkey
Vinay Patel
George Payerle
James Ratty
Pedro Salgado
Adam Sewell
Jeremy Sewell
Russell Sewell
Avijit Shingari
Travis Spoone
Mike Zarnowski

Company

National Grid
Quality Switch
Prolec GE Waukesha
Specialty Transformer Components LLC
Retired (Former PSE&G)
Richards Manufacturing Co.
Prolec GE
Crescent Power Systems
Eaton Corporation
Carte International Inc
CenterPoint Energy
Mulkey Engineering Inc.
Consolidated Edison Co. of NY
Carte International Inc.
Richards Manufacturing Co.
Electronic Technology Inc.
Quality Switch
Quality Switch
Quality Switch
Pepco
Eaton Corporation
Carte International Inc

Guests Present

Florin Faur
Sanford Fong
Hector Garza
*Gilbert Kozer
*Patrick Kozer
Angela Leigl
Brian McBride
*Barry McGlew
Tim Menter
Kent Miller
Martin Munoz Molina
Hugo Murillo
*Daniel Posada
Tony Reiss
Stefan Schindler
*Jaber Shalabi
Bruce Webb
*William Whitehead
Malia Zaman
*Requested Membership

Company

Prolec GE Waukesha
Georgia Power Co.
Orto de Mexico
Northeast Transformer Services
Northeast Transformer Services
Eaton Corporation
Marx Associates, Inc.
Cargill, Inc.
Lincoln Electric Systems
T&R Electrical Supply
Orto de Mexico
The HJ Family of Companies
Prolec Celeco
Custom Materials, Inc.
Reinhausen
VanTran Industries, Inc.
Knoxville Utilities Board
H2Scan Corporation
IEEE

Subsurface Transformers and Network Protectors Subcommittee
Task force / Working Group Report

- 1) The group met on Tuesday, March 21, 2023 at 11:00 AM CST with 22 members and 19 guests. Six (6) guests requested membership. Quorum was achieved with 22/27 (81%) of members present.
- 2) A call for patents was made; none were mentioned.
- 3) Copyright requirements were reviewed by the Chair.
- 4) An agenda was presented for approval. Motion to approve was made by Dave Blew and seconded by Mark Faulkner. The agenda was approved unanimously.
- 5) The minutes of the October 18, 2022, meeting in Charlotte were reviewed. A motion to approve was made by Dave Blew and seconded by Jeremy Sewell. The minutes were approved unanimously.
- 6) The Chair reviewed that the PAR was approved and became active May 21, 2019 and expires December 31, 2023. The Chair has applied for a two-year PAR extension on January 20th, 2023 prior to expiration of the current PAR. Expected PAR extension approval in April 2023.
- 7) Old Business - The Chair reviewed the previous meetings list of topics to be addressed in the next revision of C57.12.40:
 - a. **Update of Table 5/6 and wording in Section 5.2.1.**
 - b. **Removal of Table 7 and reference to Figures 3 & 4 instead in Section 5.6**
 - c. **Removal of Table 9 and update of Table 8 to reflect both units and remove reference to other fluids**
 - d. **Update of Section 6.2.2.3 in regards to primary switch testing**
- 8) Moving the updated document into the balloting process was discussed. A motion was made by Tom Dauzat and seconded by Nabi Almeida to move into the balloting process. The motion passed unanimously. John Vartanian will make a motion in the SC to moved C57.12.40 into the ballot process.
- 9) Creation of a Comment Resolution Group (CRG) was discussed. A motion was made by Dave Blew and seconded by Jeremy Sewell to create a CRG. The motion passed unanimously.
- 10) Volunteers for the CRG were requested. The CRG will consist of:
 - a. John Vartanian
 - b. Dan Schwartz
 - c. Mike Zarnowski
 - d. Brian Klaponski
 - e. Nabi Almeida
 - f. Avijit Shingari
 - g. Jeremy Sewell
- 11) The meeting was adjourned at 11:40 AM CST with the next meeting set for Kansas City, MO on October 24, 2023.

Respectfully submitted,
D. Schwartz, Secretary

- **C57.12.44 Secondary Network Protectors** working group –
Mark Faulkner, Chairman, Alex Macias, Secretary

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- Revision due date: **12/31/2024**
- PAR Approval Date: **3/26/2015**
- PAR Expiration Date: **12/31/22, has PAR extension**

Stage: Being revised

Document #: C57.12.44

Document Title:

STANDARD REQUIREMENTS FOR SECONDARY NETWORK PROTECTORS

Chair: Mark Faulkner **Vice-Chair** n/a

Secretary Alex Macias

Current Draft Being Worked On: DRAFT 12 **Dated:** January 2023

Meeting Date: March 20, 2023 **Time:** 1:45PM – 3PM CT

Meeting Attendance

Activity Name: C57.12.44 WG Secondary Network Protectors
Activity ID:
Number of Members in Activity = 19
Number of Members Present = 11
Quorum Present = 58%
Number of attendees = 20

Piotr Blaszczyk	The Specialty Switch Co.	guest
Brian Klaponski	Carte	member
Pedro Salgado	ETI-NJ	member
George Payerle	Carte	member
James Ratty	ETI-NJ	member
Jeremy Sewell	Quality Switch	member
Travis Spoone	Eaton	member
Russell Sewell	Quality Switch	guest
Alex Macias	CenterPoint Energy	member
Doug Craig	Richard Mfg.	member
John Vartanian	National Grid	member
Mark Faulkner	Eaton	member
Avijit Shingari	Pepco Holding Inc.	member
Malia Zaman	IEEE	guest
David Blew	Consultant	guest
Vinay Patel	ConEd	guest
Nabi Almeida	Prolec GE	guest
Dan Schwartz	Quality Switch	guest
Michael Zarnowski	Carte International	guest

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Sanford Fong

Georgia Power Co.

guest

Meeting Minutes:

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

1. Meeting called to order
 - a. 1:48 PM
2. Quorum Verification
 - a. Quorum was confirmed via Member names and show of hands
3. Membership
 - a. No new members will be added due to in Ballot Process
 - b. Dropping Jason Attard due to lack of attendance
4. Confirmation of the essential patent statement and responses
 - a. No conflicts; presented to group
5. Copyright requirements were reviewed by the Chair
 - a. No conflicts; presented to group
6. Approval of minutes of the previous meeting
 - a. Minutes presented to group
 - b. Motion to approve George Payerle, 2nd Jeremy Sewell
 - c. Minutes approved unanimously
7. Approval of agenda for this meeting.
 - a. Agenda presented to group
 - b. Agenda approved unanimously
8. Meeting Discussion – WG input on comments rejected on initial Ballot
 - a. Attendees Informed
 - i. Par extension was approved and now expires 12/31/2023.
 - ii. Comment Resolution Group (CRG) reminder are Mark Faulkner, Doug Craig, Dan Mulkey and Cory Morgan
 - b. The following were addressed during the meeting
 - i. Page 12 – Section 2: Pass a motion to remove the publication year of Standards reference year; readers can obtain the latest version or seek an older version as required
 - ii. Page 15 – Section 5.1: Temperature rise comment on Table A.1 was rejected
 - iii. The following sections involved comments asking to duplicate (aka reference) test conditions contained in the subsequent clause. The response proposed to address these comments will be: **“The test condition listed in the following “insert**

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section/clause” does not need to be repeated within the same clause or CRG will address with approval from WG”

1. Page 26 – Section 7.1
 2. Page 28 – Section 7.4
 3. Page 33 – Section 9.2
 4. Page 17 – Section 5.2.2
 5. Page 20 – Section 5.2.6
 6. Page 22 – Section 6.1.1
 7. Page 23 – Section 6.2.1
- iv. Page 28 – Section 7.4 Table (figure): It was determined that figure does not need any clarity and is legible in the standard.
1. Note: Douglas Craig did volunteer to attempt to enlarge figure and present to Working Chair
 2. Time expired
 - a. WG approved (poll taken) to TG to continue with review and addressing comments; Technical issues may be addressed with WG when necessary.
9. (IEEE Guest) Malia requested to be given an opportunity to review all the comments and the resolutions to the comments plus a redline of the revised Standard before resubmitting to RevCom.
10. Meeting adjourned at 2:35 pm
11. Fall meeting
- a. Kansas City, Missouri, USA
 - b. Date: October 22-26, 2023

Submitted by: Mark Faulkner

Date: 03/22/2023

[1] **C57.167 Guide for Monitoring Distribution Transformers** working group –

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**

Presented by Josh Verdell. Josh read a summary from Mike Thibault since Gary Hoffman was not at this meeting. Ballot recirculating after submitting to RevCom in spring of 2023. Brian Klaponski repeated a request he made at Fall 2022 meeting to have a presentation that could benefit smaller utilities

Subsurface Transformers and Network Protectors Subcommittee
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PC 57.12.53 Guide for mitigating corrosion on subsurface transformers

Will Elliott, Chair; Avijit Shingari, Vice-chair; Audrey Siebert-Timmer, secretary
PA R Approval Date:

2/23/2022

○ PAR Expiration Date: **12/31/2026**

Document #: _____ **PC57.12.53**

Document Title: **C57.12.53 Guide on Mitigating Corrosion on Subsurface Transformers and Network Protectors**

Chair: Will Elliott Vice-Chair: Avijit Shingari

Secretary: Audrey Siebert-Timmer Percent Complete: 75%

Current Draft Being Worked On: Draft 2 Dated: March 21, 2023

Meeting Date: March 21, 2023 Time: 1:45 PM CDT

Attendance:	Members	<u>16</u>
	Guests	<u>21</u>
	Total*	<u>37</u>

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

Attendance:

Members (Name & Company)

Nabi Almeida, Prolec GE
Dave Blew, Consultant
Douglas Craig, Richards Manufacturing Co.
Thomas Dausat, AEP-SWEPCO
Will Elliott, AEP-SWEPCO
Brian Klaponski, Carte International Inc.
Tyler Morgan, Duke Energy
Daniel Mulkey, Mulkey Engineering Inc.
George Payerle, Carte International Inc.
Dan Schwartz, Quality Switch, Inc.
Adam Sewell, Quality Switch, Inc.
Jeremy Sewell, Quality Switch, Inc.
Avijit Shingari, Pepco Holdings Inc.
James Spaulding, City of Fort Collins
John Vartanian, National Grid
Michael Zarnowski, Carte International Inc.

Guests (Name & Company)

Paul Chisholm, IFD Corporation
Daniel Crockett, Ameren
Eric Euvrard, RHM International
Benjamin Garcia, Southern California Edison
Hector Garcia, Orto de Mexico
Michael Gonzales, Southern California Edison
Saif Hossain, Trench Limited
Qasim Khan, NEETRAC - Georgia Tech
Martin Munoz, Orto de Mexico
Vinay Patel, Consolidated Edison Co. of NY
Miguel Plascenwa, PG&E
Daniel Posadas, Prolec Celeco
Jarrod Prince, ERMCO
James Ratty, Electronic Technology Inc.
Clemens Reiss IV, Custom Materials
Pedro Salgado, Electronic Technology Inc.
Russ Sewell, Quality Switch, Inc.
Timothy Tillery, Howard Industries
Reinaldo Valentin, Duke Energy
Mike Waldrop, Memphis Light, Gas & Water

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Shelby Walters, Howard Industries

Meeting Minutes:

1. Will Elliott called the meeting to order at 1:45 PM CST.
2. Opening remarks and announcements.
 - i. AMS system has been discontinued. Paper rosters were circulated.
3. Membership changes were noted:
 - i. Added: **Douglas Craig, George Payerle and John Vartanian**
 - ii. Changed to Guest: **Brad Kittrell**
4. Quorum was verified. The working group consisted of **20** members, requiring **11** for quorum. **12** members were counted at the start of the meeting. Attendance records later confirmed **16** members attended.
5. Will Elliott reviewed IEEE SA Copyright Policy and Essential Patent Claims. No issues were raised.
6. Will Elliott requested approval of the Spring 2023 Agenda. **Mike Zarnowski made a motion to approve the Spring 2023 Agenda. Second by Dan Mulkey. Motion was unanimously approved.**
7. Will Elliott requested approval of the Fall 2022 Minutes. **Tom Dauzat made a motion to approve the Fall 2022 Minutes. Second by George Payerle. Motion was unanimously approved.**
8. Old Business:
 - i. Will Elliott reviewed editorial changes made to the draft including:
 - a. Cleaned bibliography, and added references throughout the draft
 - b. Grammar changes throughout the document
 - c. Add reference to the USGS for the salinity categories
 - ii. Will Elliott highlighted technical points that members may want to consider changes:
 - a. 6.2.2 stainless steel section was discussed. Several members suggested listing 316 and 316L explicitly and listing the minimum composition for chromium and molybdenum.
 - b. Section 8 submersible equipment enclosure material validation testing changes were discussed, but no changes were made. Members were asked to include further comments when they comment on the draft document. Points of discussion included:
 1. Sample sizes
 2. Test temperature
 3. Changes to salinity during testing
 4. Maximum corrosion depth criteria evaluated by 3D CT scan
 - iii. Will Elliott presented the cathodic protection taskforce findings: evaluation of cathodic protection criteria according to NACE SP0169 standard.
 - a. Proposed changes to Cathodic Protection Section
 - b. Additional definitions
 1. Cathodic polarization
 2. Polarized potential
 - c. Added potential measurement figure into the draft to show the electrical connection diagram.

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- d. Changes to cathodic protection criteria, including both polarized potential and cathodic polarization.

iv. Tom Dauzat made a motion to approve these changes. Second by Nabi Almeida. Motion was unanimously approved.

- v. The group discussed the next steps:
 - a. Members and guests were asked to review the draft and submit comments by September 1st for further discussion in the Fall meeting.

9. New Business:

- i. No new business was brought up.

10. Next meeting: October 24, 2023, in Kansas City, MO USA

- i. The following attendees requested membership and will be added to membership for the Fall 2023 meeting: **Vinay Patel**

11. The meeting was adjourned at 3:00 PM CDT.

Submitted by:

Aviji

Submitted Date:

03/

21/2023

Old Business:

No old business

New Business:

Reminder: IEEE Collabratec - <https://ieee-collabratec.ieee.org/>

It is free for IEEE members, and only requires login using your IEEE account.

Comment by Dan Mulkey RE: IEEE document review after MEC review. For the most part very good with grammar, formatting, etc by 3rd party, but by the time it comes back it is too late in the process. Malia said that MEC process is limited to 30 days. 3rd party review is much longer. Suggestion was made that the document could be submitted up to a year in advance for 3rd party review prior to MEC submission. It would lead to a better document. Mali said that is currently done by request, primarily for WG where English is a second language.

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Next meeting:

- October 22 to 26, 2023 in Kansas City, MO

Adjourn: 11:36 AM CST

Respectfully submitted by George
Payerle, chair Submersible Transformers
and Network Protectors Subcommittee
April 13, 2023