



## **Transformers Committee**

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**Chair:** Ed teNyenhuis **Vice Chair:** David Wallach **Secretary:** Bill Griesacker

**Treasurer:** Troy Tanaka **Awards Chair/Past Chair:** Bruce Forsyth

**Standards Coordinator:** Steve Shull

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# **IEEE/PES Transformers Committee**

## **Spring 2022 Meeting Minutes**

**Denver, Colorado  
March 27-31, 2022**

**Unapproved**

(These minutes are on the agenda to be approved at the next meeting in Fall 2022)

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- 4.0 Chair’s Remarks & Report – Ed teNyenhuis
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### **CLOSING SESSION – THURSDAY MARCH 31, 2022**

- 12.0 Chair’s Remarks and Announcements – Ed teNyenhuis
- 13.0 Meetings Planning SC Minutes & Report – Tammy Behrens
- 14.0 Reports from Technical Subcommittees (decisions made during the week)
- 15.0 Additional Report from the Standards Coordinator – Steve Shull
- 16.0 New Business
- 17.0 Closing Session Adjournment

### **OTHER REPORTS**

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## **ANNEXES – UNAPPROVED MINUTES OF TECHNICAL SUBCOMMITTEES**

***NOTE:*** The Annexes included in these minutes are **unapproved** by the respective subcommittees and are accurate as of the date the Transformers Committee meeting minutes were published. Readers are encouraged to check the Transformers Committee website ([www.transformerscommittee.org](http://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 – Ed Smith
- 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 – Jerry Murphy
- Annex M. Subsurface Trans & Network Protectors SC – George Payerle



## General Administrative Items

# 1 AGENDA

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### Opening Session

**Monday, March 28, 2022: 8:00 am - 9:15 am MDT (UTC-06:00)**

(Attendance recorded by paper 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 2021 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-14 ..... Christoph Ploetner
  - 10.3. Standards Coordinating Committee, SCC4 (Electrical Insulation) ..... Evanne Wang
  - 10.4. ASTM ..... Tom Prevost
  - 10.5. 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 31, 2022: 11:00 am - 12:00 pm MDT (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. Bushings ..... Eric Weatherbee
  - 3.2. Dielectric Tests ..... Poorvi Patel
  - 3.3. Distribution Transformers ..... Ed Smith
  - 3.4. Dry Type Transformers ..... Casey Ballard
  - 3.5. Transformers and Reactors for HVDC Applications ..... Ulf Radbrandt
  - 3.6. Instrument Transformers ..... Thomas Sizemore
  - 3.7. Insulating Fluids ..... Scott Reed
  - 3.8. Insulation Life ..... Sam Sharpless
  - 3.9. Performance Characteristics ..... Rogerio Verdolin

- 3.10. Power Transformers ..... Ryan Musgrove
- 3.11. Standards ..... Dan Sauer
- 3.12. Subsurface Transformers & Network Protectors ..... George Payerle
- 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

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### 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.

#### Legend:

CM      Committee Member

CM-LM Committee Member-IEEE Life Member

CM-EM Committee Member-Emeritus

#### Committee Member Attendance:

Member Type	Last Name	First/Given Name	Company	Opening Session	Closing Session
CM	Anderson	Gregory	GW Anderson & Associates, Inc.	X	X
CM	Ansari	Tauhid	ABB Inc.	X	
CM	Antosz	Stephen	Stephen Antosz & Associates, Inc	X	
CM	Arteaga	Javier	ABB Inc.	X	X
CM-LM	Ayers	Donald	Ayers Transformer Consulting	X	X
CM	Ballard	Robert	ABB Inc.	X	X
CM	Beaster	Barry	Delta Star Inc.	X	
CM	Betancourt	Enrique	Prolec GE	X	X
CM	Biggie	Kevin	Weidmann Electrical Technology	X	X
CM-LM	Binder	Wallace	WBBinder Consultant		X
CM	Blaydon	Daniel	Baltimore Gas & Electric	X	
CM-LM	Boettger	William	Boettger Transformer Consulting LLC	X	X
CM	Boman	Paul	Hartford Steam Boiler	X	
CM	Brown	Darren	Howard Industries	X	X
CM	Castellanos	Juan	Prolec GE	X	X
CM	Chakraborty	Arup	Delta Star	X	
CM	Chiang	Solomon	The Gund Company	X	
CM	Chrysler	Rhett	ERMCO	X	X
CM	Dauzat	Thomas	GE	X	X
CM	Davis	Eric	Burns & McDonnell	X	X
CM	Del Rio	J. Arturo	Trench Limited	X	X

Member Type	Last Name	First/Given Name	Company	Opening Session	Closing Session
CM	Digby	Scott	Duke Energy	X	X
CM	Dix	Larry	Quality Switch, Inc.	X	
CM	Flores	Hugo	ABB	X	
CM	Forsyth	Bruce	Bruce Forsyth and Associates LLC	X	X
CM	Frimpong	George	ABB Inc.	X	
CM	Garcia	Eduardo	Siemens	X	X
CM	Gaytan	Carlos	Prolec GE	X	
CM	Gilles	Bargon	FISO Technologies		X
CM-LM	Girgis	Ramsis	ABB Inc.	X	X
CM	Griesacker	Bill	Doble Engineering Co.	X	X
CM	Hakim	Shamaun	CG Power Systems USA Inc	X	
CM	Hampton	Kenneth	BGE	X	
CM	Harley	John	FirstPower Group LLC	X	
CM-LM	Herron	John	Raytech USA	X	X
CM	Hoffman	Gary	Advanced Power Technologies	X	
CM-LM	Hopkinson	Philip	HVOLT Inc.	X	X
CM	Jordan	Stephen	TVA	X	X
CM	Joshi	Akash	Black & Veatch	X	
CM	Kaineder	Kurt	Siemens Oesterreich AG	X	X
CM	King	Gary	Howard Industries	X	X
CM	Kiparizoski	Zan	Howard Industries	X	
CM	Klaponski	Brian	Carte International Inc.	X	X
CM	Kornowski	Marek	Polycast Int'l	X	X
CM	Kraemer	Axel	MR	X	X
CM	Kraetge	Alexander	OMICRON	X	X
CM	Kulasek	Krzysztof	ABB Inc.	X	
CM	Levin	Aleksandr	WICOR Americas	X	X
CM	Li	Weijun	Braintree Electric Light Department	X	
CM	Mai	Tim-Felix	Siemens	X	X
CM	Malde	Jinesh	M&I Materials Ltd	X	
CM	Mani	Kumar	Duke Energy Inc.	X	X
CM	Matthews	Lee	Howard Industries	X	
CM	Melle	Thomas	Highvolt	X	
CM-LM	Miller	Kent	T&R Electric Supply Co.	X	
CM	Mulkey	Daniel	Pacific Gas & Electric	X	X
CM	Murray	David	Tennessee Valley Authority	X	X
CM	Musgrove	Ryan	Oklahoma Gas & Electric	X	X
CM	Nambi	Shankar	Bechtel Power Corp	X	X
CM	Narawane	Aniruddha	Power Distribution, Inc. (PDI)	X	
CM	Parkinson	Dwight	EATON Corporation	X	X
CM	Patel	Poorvi	ABB Inc.	X	X
CM	Patel	Sanjay	Smit Transformer Sales, Inc	X	
CM	Payerle	George	Carte International Inc.	X	X

Member Type	Last Name	First/Given Name	Company	Opening Session	Closing Session
CM	Pointner	Klaus	Trench Austria GmbH	X	X
CM	Prevost	Thomas	OMICRON electronics Corp USA	X	
CM	Radbrandt	Ulf	ABB	X	X
CM	Reed	Scott	MVA Diagnostics, Inc.	X	X
CM	Robalino	Diego	Megger	X	X
CM	Roman	Zoltan	GE	X	X
CM	Roussell	Marnie	Entergy	X	X
CM	Sankarakurup	Dinesh	Duke Energy	X	X
CM	Sarkar	Amitabh	CG Power Systems	X	
CM	Sauer	Daniel	Cooper Power Systems	X	X
CM	Sbravati	Alan	Cargill Inc	X	X
CM	Schappell	Steven	SPX Transformer Solutions, Inc.	X	
CM	Schweiger	Ewald	Siemens AG	X	X
CM	Selvaraj	Pugazhenth	Virginia Transformer Corp	X	
CM	Sen	Cihangir John	Duke Energy	X	X
CM	Sewell	Adam	Quality Switch, Inc.	X	
CM	Sewell	Jeremy	Quality Switch, Inc.	X	
CM	Sharp	Michael	Trench Limited	X	X
CM	Sharpless	Samuel	Rimkus Consulting Group	X	X
CM	Shull	Stephen	The Empire District Electric Company	X	X
CM	Sizemore	Thomas	ABB Inc.	X	X
CM	Skinger	Kenneth R.	Chicago Bridge & Iron	X	X
CM	Snyder	Steven	ABB Inc.	X	X
CM	Som	Sanjib	Pennsylvania Transformer	X	X
CM	Spitzer	Thomas	City Transformer Service Co.	X	
CM	Spurlock	Mike	AEP	X	X
CM	Stank	Markus	MR	X	X
CM	Stankes	David	3M	X	
CM	Sweetser	Charles	OMICRON electronics Corp USA	X	X
CM	Swinderman	Craig	Mitsubishi Electric Power Products	X	X
CM	Tanaka	Troy	Burns & McDonnell	X	X
CM	teNyenhuis	Ed	ABB Inc.	X	X
CM	Thibault	Mike	Pacific Gas & Electric	X	X
CM	Thompson	Ryan	Burns & McDonnell	X	X
CM	Tillery	Timothy	Howard Industries	X	X
CM	Tostrud	Mark	Dynamic Ratings, Inc.	X	X
CM	Traut	Alan	Howard Industries	X	
CM	VanderWalt	Alwyn	Public Service Company of New Mexico	X	X
CM	Varghese	Ajith	SPX Transformer Solutions, Inc.	X	X
CM	Varnell	Jason	SPX Transformer Solutions, Inc.	X	
CM	Verdell	Joshua	ERMCO	X	X
CM	Wallace	David	ABB Inc.	X	X

Member Type	Last Name	First/Given Name	Company	Opening Session	Closing Session
CM	Wallach	David	Duke Energy	X	X
CM	Watson	Joe	ZTZ Services	X	
CM	Webb	Bruce	Knoxville Utilities Board	X	X
CM	Wicks	Roger	DuPont	X	X
CM-LM	Wilks	Alan	Consultant	X	
CM-LM	Wright	Jeffrey	Duquesne	X	X
CM	Zibert	Kris	Allgeier, Martin and Associates	X	X

Based upon the above attendance totals:

**Quorum was achieved at Monday Opening Session (111/213=52%).**

**Quorum was not achieved at Thursday Closing Session (76/213=35%).**

## 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.

### Legend:

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

Non-committee member attendance:

Member Type	Last Name	First Name	Company Name	Opening Session	Closing Session
II	Abbas	Mubarak	Siemens energy		X
II	Adams	Kayland	Prolec GE Waukesha	X	
II	AlAhmed	Ahmed	Evergy-Wolf Creek	X	X
II	Aldenlid	Jennie	Hitachi Energy	X	X
II	Almeida	Nabi	Prolec GE USA	X	X
AP	Alonso	Mario	Georgia Transformer	X	
AP	Arnold	Elise	Starkstrom Gerätebau GmbH	X	X
II	Avanoma	Onome	MJC	X	
AP	Bargone	Gilles	FISO	X	X
II	Bates	Jared	Oncor Electric Delievery	X	X
II	Beaudoin	Jason	Weidmann	X	X

Member Type	Last Name	First Name	Company Name	Opening Session	Closing Session
AP	Behrens	Tammy	Prolec GE Waukesha	X	X
AP	Benach	Jeffrey	Megger	X	
II	Benzler	Olle	Megger	X	X
AP	Bernesjo	Mats	Hitachi Energy	X	
AP	Berube	Jean-Noel	Rugged Monitoring Quebec Inc	X	X
AP	Blew	David	Retired (PSE&G)	X	X
AP	Bolliger	Alain	HV TECHNOLOGIES, Inc.	X	
AP	Bolliger	Dominique	HV TECHNOLOGIES, Inc.	X	
II	Bonn	Mike	Soltex	X	
AP	Bradshaw	Jeremiah	Bureau of Reclamation	X	X
AP	Brannen	Randy	Southern Company	X	
AP	Britton	Jeffrey	Phenix Technologies Division of Doble Engineering Company	X	X
II	Burke	David	Xcel Energy		X
AP	Calitz	David	Siemens Energy	X	
II	Carrizales	Juan	PROLEC GE	X	X
II	Casserly	Edward	Ergon, Inc	X	
AP	Chambers	Stuart	Powertech Labs	X	
AP	Chisholm	Paul	IFD Corporation	X	
II	Chorzepa	Jaroslav	US ABB	X	X
AP	Christodoulou	Larry	Electric Power Systems	X	X
II	Coker	Anthony	M&I Materials	X	
II	Cordova	Olivia	Bureau of Reclamation	X	X
AP	Craven	Michael	Qualus Power Services	X	X
II	CRUZ VALDES	JUAN	PROLEC GE INTERNACIONAL	X	X
AP	Dahlke	Michael	Central Moloney, Inc.	X	X
II	Davoodi	Pooneh	Delta Star	X	X
II	de Oliveira e Silva Pinto	Jonas	Hitachi Energy	X	
II	de Oliveira Filho	Herton	PSE&G	X	
II	Debass	Samson	EPRI	X	X
AP	DeRouen	Craig	ERMCO	X	
II	Deverick	Jonathan	Dominion Energy	X	
AP	Dillon	Nikolaus	Dominion Energy	X	X
II	Door	Jeffrey	The H-J Family of Companies	X	
II	Doutrelepont	Alex	Siemens Energy	X	X
II	DOWNEY	ANDY	Prolec GE Waukesha		X
II	Draper	Zachary	Delta-X Research	X	
AP	Dulac	Hakim	Qualitrol	X	
II	Eastman	John	ZTZ Services	X	
AP	Elliott	William	Prolec GE USA	X	X
II	Ermakov	Evgenii	Hitachi Energy	X	X

Member Type	Last Name	First Name	Company Name	Opening Session	Closing Session
II	Espindola	Marco	Hitachi Energy	X	X
II	Faherty	Joseph	OTC Services		X
II	Falkenburger	Thomas	Coil Innovation USA, Inc.	X	
AP	Faur	Florin	Prolec GE Waukesha	X	
AP	Fausch	Reto	RF Solutions	X	X
II	Fong	Sanford	Georgia Power	X	
AP	Frotscher	Rainer	Maschinenfabrik Reinhausen		X
II	Frye	Richard	Eaton	X	X
II	Fyrer	Bob	DuPont	X	
AP	Gamboa	Jose	The H-J Family of Companies	X	
AP	Gara	Lorne	Shermco Industries	X	
II	GARZA	HECTOR	ORTO DE MEXICO SA DE CV	X	
II	GOMEZ-HENNIG	EDUARDO	Siemens Energy	X	X
AP	Gragert	Jeffrey	Xcel Energy	X	X
AP	Gustavsson	Niklas	Hitachi Energy	X	X
II	Harper	Robert	Soltex Inc.	X	
AP	Heiden	Kyle	Eaton Corporation	X	X
II	Hernandez	Sergio	Hammond Power Solutions	X	X
II	Hernandez Decanini	Giovanni	Virginia Transformers	X	
II	Hoffman	Saramma	PPL	X	X
II	Hogg	Ryan	Bureau of Reclamation	X	X
II	Hollrah	Derek	Burns & McDonnell	X	
II	Hutchinson	Zachary	East Kentucky Power Cooperative	X	
II	Issack	Ramadan	AEP	X	
AP	Jakob	Karl	Cargill-Power Systems		X
II	Jensen	Nick	Delta Star	X	X
II	Johnson	Jeremy	Intermountain Electronics	X	
AP	KITTRELL	BRADLEY	Con Edison	X	
AP	Klein	Kenneth	Johnson Electric Coil	X	X
II	Knapp	Evan	Eaton	X	X
AP	KOSHEL	ANTON	Delta Star Inc.	X	X
II	Kotula	John	Dominion Energy	X	
AP	Kurth	Bernhard	Reinhausen Manufacturing	X	
II	Kutzleb	Michelle	TJH2b Analytical Services	X	
AP	Lachman	Mark	Doble Engineering	X	
AP	Lamontagne	Donald	Arizona Public Service Co.	X	
II	Larison	Andrew	Hitachi Energy USA	X	X
AP	Lawless	Andrew	POTENCIA PARTNERS	X	X
II	Leigl	Angela	Eaton Corporation	X	X
II	Lewand	Lance	DOBLE ENGINEERING	X	

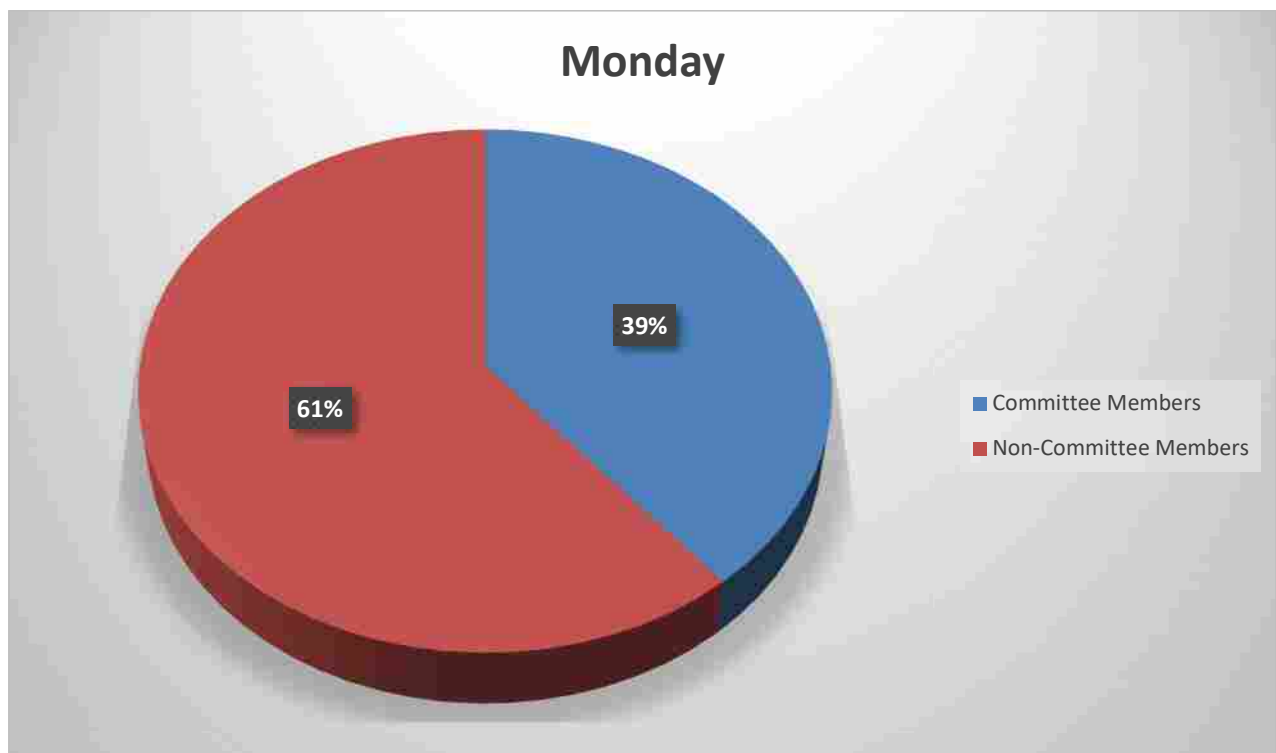
Member Type	Last Name	First Name	Company Name	Opening Session	Closing Session
AP	Lovins	Colby	Federal Pacific	X	X
II	Lucas	Tiffany	ProlecGE		X
II	Mahajan	Kushal	EATON	X	
II	Mani	Balakrishnan	Virginia Transformer Corp	X	
AP	martinez	rogelio	Georgia Transformer	X	
II	Matson	Tom	Xcel Energy	X	
II	Mbouombouo	Mama	Hitachi Energy	X	
AP	McBride	Brian	Cargill	X	X
AP	McBride	Jim	JMX High Voltage	X	X
AP	Mccullough	Douglas	Maxima - Hyundai	X	
II	Mcgrail	Anthony	Doble Engineering Co.	X	X
AP	Middleton	Robert	RHM International	X	
II	Miller	Philip	Memphis Light, Gas & Water	X	
II	Milojevic	Goran	DV Power Inc.	X	
AP	Montpool	Rhea	Schneider Electric	X	
AP	Morales-Cruz	Emilio	Qualitrol		X
AP	Munn	William	Southern Company Services	X	
AP	Munoz Molina	Martin	ORTO DE MEXICO SA DE CV	X	
II	Nesvold	Brady	Xcel Energy	X	X
AP	Nims	Joe	Allen & Hoshall	X	
AP	oakes	stephen	WEG	X	X
ii	Panesar	Parminder	Virginia Transformer Corp.	X	
II	Patel	Nitesh	Hyundai Power Transformers, USA	X	
II	Patel	Vinay	Con Ed	X	
AP	Pepe	Harry	Phenix Technologies	X	X
II	Peterson	Tim	NOMOS / NASS		X
II	Pinard	Matthew	Weidmann Electrical Technology, Inc.	X	
II	Pollaro	Dominic	NASS	X	
AP	Portillo	Homero	Advanced Power Technologies	X	
II	POSADAS	DANIEL	PROLEC SA DE CV	X	
II	Powell	Chad	Hitachi Energy	X	
II	Powell	Chris	Intermountain Electronics	X	
AP	Prince	Jarrold	ERMCO	X	
AP	Pruente	John	Prolec GE Waukesha	X	
AP	Rashid	Adnan	Measurement Canada	X	X
II	Reepe	Robert	Georgia Power Company	X	
II	Rehkopf	Sebastian	Maschinenfabrik Reinhausen	X	X
AP	Reiss Iv	Clemens	Custom Materials	X	X
II	Riggins	Benjamin	Xcel Energy	X	
AP	Riordan	Kevin	WEG Transformers USA	X	X
II	Rocque	Timothy	Prolec GE Waukesha	X	X



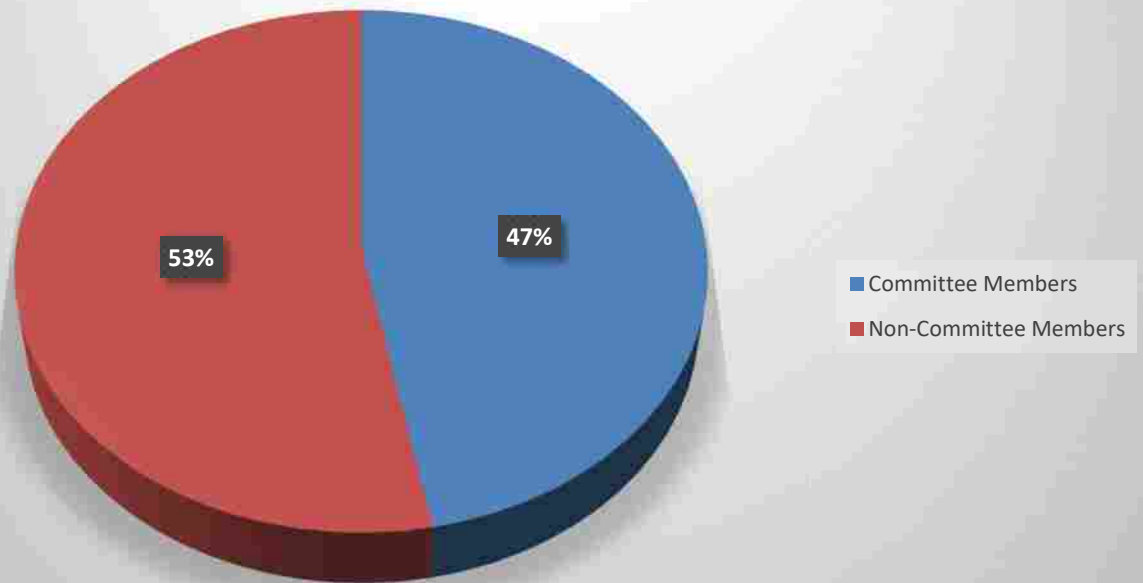
Member Type	Last Name	First Name	Company Name	Opening Session	Closing Session
AP	Saad	Mickel	Hitachi Energy	X	
AP	Sahin	Hakan	Virginia Transformer Corp.	X	
II	Sanchez	Albert	Knoxville Utilities Board	X	X
II	Saraf	Manish	Hammond Power Solutions Inc	X	
II	Sato	Erick	Siemens Energy	X	
AP	Schiessl	Markus	SGB		X
II	Schindler	Stefan	Maschinenfabrik Reinhausen GmbH	X	X
AP	Schneider	Jeff	Power Partners	X	
AP	Schrammel	Alfons	Siemens Energy	X	X
II	Schrom	Wesley	Carolina Dielectric Maintenance & Testing Co	X	
AP	Schwartz	Daniel	Quality Switch	X	
AP	Sewell	Russell	quality switch inc	X	
AP	Shannon	Michael	Rea Magnet Wire	X	
II	Shingari	Avijit	PEPCO HOLDINGS	X	X
II	Shosanya	Adetokunbo	Xcel Energy	X	X
AP	Siebert-Timmer	Audrey	IFD Corporation	X	
AP	Simons	Andre	JFE Shoji Canada Inc.	X	
II	Soeller	Markus	Power Diagnostix Systems GmbH	X	X
II	Sohail	Muhammad Abdullah	Trench Limited	X	
AP	Sonnenberg	Brian	Instrument Transformers LLC	X	
II	Soto	Mauricio	Hitachi Energy		X
AP	Sparling	Brian	Dynamic Ratings Inc.	X	X
AP	Spaulding	James	City of Fort Collins	X	X
AP	Staley	Bradley	Salt River Project	X	X
II	Stechschulte	Kyle	American Electric Power	X	X
II	Steele	Hampton	TVA	X	X
AP	Steeves	Greg	Baron USA, LLC	X	X
AP	Steinman	Andrew	Delta Star	X	X
II	Stretch	Kerwin	Siemens Energy	X	
AP	Sullivan	Liz	Dominion Energy	X	
II	Sumner	Dean	SDMyers	X	
AP	Szczechowski	Janusz	MASCHINENFABRIK REINHAUSEN GMBH	X	X
AP	Taylor	Marc	JFE Shoji Power Canada Inc.	X	
AP	Tedesco	Joseph	Hitachi Energy USA	X	X
AP	Theisen	Eric	Metglas	X	
II	Tolcachir	Eduardo	Tubos Trans Electric S.A.	X	X
II	Tournoux	Dan	Prolec-GE Waukesha, Inc.	X	
II	Trifunoski	Risto	Trench Group	X	
AP	Uhlmann	Olivier	Reinhausen Canada Inc.	X	X
II	vanTol	Robert	Commonwealth Associates, Inc.	X	

Member Type	Last Name	First Name	Company Name	Opening Session	Closing Session
AP	Vartanian	John	national grid	X	
AP	Vongemmingen	Richard	Dominion Energy	X	X
AP	Walters	Shelby	Howard Industries, Inc.	X	
AP	Wang	Evanne	DuPont	X	X
II	Washburn	Alan	Burns & McDonnell	X	X
II	Wazir	Muhammad	Eaton	X	
AP	Weiss	Zachery	WEG Transformers	X	
AP	Weyer	Daniel	NPPD	X	
AP	Whitten	Christopher	Hitachi Energy	X	
AP	Williams	Trenton	Advanced Power Technologies	X	
AP	Wimberly	Barrett	General Electric	X	
AP	Winter	Dr.Alexander	HIGHVOLT Prueftechnik Dresden GmbH	X	
II	Ynui	Andrea	Siemens Energy	X	
II	Zarnowski	Michael	Carte International Inc	X	
II	Zemanovic	Kyle	Eaton	X	X

In addition to the above totals, there were 150 of the total attendees that attended **both** the Monday and Thursday Sessions and **150** that attended **either** the Monday **or** the Thursday Session. It is a coincidence and not typical that both of these totals are equal.



## Thursday



## Monday Opening Session

### 3 APPROVAL OF AGENDA AND PREVIOUS MINUTES – ED TENYENHUIS

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At 8:00 AM CST the Chair (Ed teNyenhuis) called the meeting to order. He welcomed everyone to the in-person meeting. Ed thanked the past chair for his service, a tenure served entirely with virtual meetings.

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 2021 minutes were posted. The Chair requested any comments or changes. There were no comments so the Fall 2021 minutes were approved as published.

### 4 CHAIR'S REMARKS & REPORT – ED TENYENHUIS

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Chair's Report and Remarks – Presented at the Monday General Session – Spring 2022

#### 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](http://www.ieee-pes.org/statement-of-purpose-and-scope-of-activities-for-the-pes-technical-council) .

##### 4.1.1 Technical Council Officers & Members

The officers and members of the Technical Council are listed below for your reference. Note that Jim McBride, who is active in the Transformer Committee, is on the Technical Council Officer rotation and will be a future Chair. Congratulations Jim!

#### 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 .....	Andrew Leon

**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 17-21, 2022 – PES General Meeting, Denver CO
- November 2022 – Technical Council Retreat (date/place to be confirmed)
- January 2023 – JTCM (date/place to be confirmed)

#### 4.1.3 memberplanet (123Signup Replacement)

IEEE PES has awarded a contract to the company *memberplanet* to replace 123Signup. The new system is in the design phase and is scheduled to be ready in summer 2022. It is hoped that this will be used for our Fall 2022 meeting. IEEE PES will cover the cost of the annual contract for the memberplanet tool except for pass-through charges for event registration (i.e. credit card transaction fees).

#### 4.1.4 Working Group Chair Fundamentals

IEEE PES will be implementing a mandatory web training for all working group Chairs to be completed in 2022. This will be distributed shortly to all present working group leaders. 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 Officer Transition for 2022-2023 Term

In accordance with the Transformers Committee's Policies and Procedures, the term of the Chair, Vice Chair, Secretary, and Past Chair positions are each 2-years, after which a transition shall occur from Secretary to Vice Chair, from Vice Chair to Chair, and from Chair to Past Chair. Such a rotation occurred on January 1, 2022. In addition, the outgoing Chair has the privilege of appointing the incoming Secretary, with the concurrence of the outgoing Past Chair. The terms and appointments of the Treasurer and Standards Coordinator are outlined in Committee's Policies and Procedures and are not affected by the officer rotation. The Committee officers for the 2022-2023 term will be as follows:

Chair .....	Ed teNyenhuis
Vice Chair .....	David Wallach
Secretary .....	Bill Griesacker
Treasurer.....	Troy Tanaka
Standards Coordinator.....	Steve Shull
Past Chair .....	Bruce Forsyth

With this transition Sue McNelly, completed her 8-year commitment as an officer and the Committee thanks Sue for her contributions and selfless service during the 8 years she has served as an officer.

The Committee also very specially thanks Bruce Forsyth for his extraordinary term as Chair during the covid crisis. Bruce had to manage unique challenges that included avoiding financial disaster for the Committee. The Committee is extremely fortunate for Bruce's expert guidance where he also missed leading our committee meetings face to face (all meetings were virtual).

#### 4.2.2 Upcoming Subcommittee Leadership Changes

Two subcommittees had leadership changes starting on January 1, 2022.

**Dielectric Test Subcommittee:** On December 31, 2021, **Ajith Varghese** completed a 5-year term as Chair and stepped down. **Poorvi Patel** (EPRI) began a 3-year term as Chair starting January 1, 2022.

**Power Transformer Subcommittee:** On December 31, 2021, **Bill Griesacker** completed a 5-year term as Chair and stepped down. **Ryan Musgrove** (OG&E) began a 3-year term as Chair starting January 1, 2022.

The Committee thanks Ajith and Bill for their dedication and service over the past five years and welcomes Poorvi and Ryan to the Administrative Subcommittee with best wishes for success in their new roles.

#### 4.2.3 Liaison Representatives - Appointed by Committee Chair

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

#### 4.2.4 Committee Schedule

The Spring 2022 Transformers Committee meeting is planned to be our first in person meeting since Fall 2019. There were 3 virtual meetings held during 2020 – 21.

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

Spring 2022	Denver, CO	March 27-31, 2022
Fall 2022	Charlotte, NC	October 16-20, 2022
Spring 2023	Milwaukee, WI	March 19-23, 2023
Fall 2023	Kansas City, MO	October 22–26, 2023

Check the Committee website ([www.transformerscommittee.org](http://www.transformerscommittee.org)) regularly for information on upcoming meetings.

#### 4.2.5 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.

During the past two years, several Transformers Committee working groups and task forces have made effective use of virtual meetings between the spring and fall main Committee meetings. This has allowed them to make timely progress on their respective documents. All activity leaders are encouraged to use the resources available to them to advance their work. In addition, activity leaders are reminded to track attendance at each virtual meeting and to record attendance in the minutes of those meetings as well as in the Committee's Association management System (AMS) (when it becomes available), just as they would for a meeting held in the spring or fall. Finally, 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.

#### 4.2.6 Avoiding PAR Extensions

Working Group Chairs are encouraged to 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.

#### 4.2.7 Meeting App

Based on positive feedback from the previous meetings, the Committee plans to continue using the IEEE EventHub App for in-person meetings.

#### 4.2.8 Association Management System (AMS) Records

Per above, there will not be an AMS tool in place for the Spring 2022 meeting. All activity leaders will need to use the 123Signup downloads done in December 2021 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.

#### 4.2.9 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.

#### 4.2.10 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.

#### 4.2.11 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.



#### 4.2.12 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 the thirteen (16) Letters of Assurance pertain to our committee as of March 11, 2022 – there are 3 new LoA's.

*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.	<b>Andrew Panto - COO/Director of Engineering</b> email: aspanto@seecoswitch.com	5,560,474 (US)	<a href="#">18 Oct 2011</a>	yes	18 Oct 2011
C37.60	S&C Electric Company	<b>Mark W. Stavnes-Vice President, Fuse Products and Polymer Products Division</b> email: mstavnes@sandc.com;	not indicated	<a href="#">29 Aug 2008</a>	non-awareness statement	2 Sep 2008
C37.102	Schweitzer Engineering Laboratories, Inc.	<b>Richard Edge - Senior Counsel, Legal,</b> email: ipmail@selinc.com	9,496,707 (US)	<a href="#">18 Jan 2022</a>	yes	18 Jan 2022
C37.245	Schweitzer Engineering Laboratories, Inc.	<b>Richard Edge, Legal</b> email: ipmail@selinc.com	7,319,576 (US)	<a href="#">11 Apr 2014</a>	yes	11 Apr 2014
C57.12.200	Megger Sweden AB	<b>Niclas Wetterstrand, Product Management</b> email: niclas.wetterstrand@megger.com	8,428,895 (US)	<a href="#">25 Sep 2019</a>	yes	30 Sep 2019
C57.104	Arizona Public Service Company	<b>John Finn - Director Venture Investment Management, Venture Investments</b> email: john.finn@pinnaclewest.com	not indicated	<a href="#">12 Apr 2019</a>	yes	16 Apr 2019
C57.127	ABB Technology Ltd.	<b>Bjorn Dahlstrand, ABB AB, Legal Affairs and Compliance/IP</b> email: bjorn.dahlstrand@seabb.com	6,340,890 (US)	31 Aug 2005	yes	6 Sep 2005
C57.127	General Electric Technology GmbH	<b>Frank Landgraff-Executive Counsel, GE Power Legal Department</b> email: frank.landgraff@ge.com;	7,286,968B2 (US)	<a href="#">14 Aug 2018</a>	yes	16 Aug 2018
C57.139	Maschinenfabrik Reinhausen GMBH	<b>Stefanie Hofmeister-Counsel, Corporate Legal Services</b> email: patents@reinhausen.com	not indicated	<a href="#">13 Jan 2013</a>	yes	16 Jan 2013
C57.143	Roger Fenton	<b>Roger Fenton, Principal Engineer, Fenton Solutions</b> email: roger.a.fenton@gmail.com	15/371,085 (US)	<a href="#">9 Oct 2018</a>	yes	12 Oct 2018
C57.143	IntellPower Pty Ltd	<b>Oleg Roizman - Principal, Innovations &amp; Digital Transformation, 10 Warina Road, Carnegie, Victoria, Australia, tel: +61- oleg.roizman@intellpower.com,</b>	10,101,313 B2 (US)	<a href="#">13 Nov 2021</a>	yes	15 Nov 2021
C57.147 and C57.155	Cooper Power Systems, LLC	<b>Alan Yerges, Engineering - Power Systems Division IP</b> email: alanpyerges@eaton.com	6,398,986 (US) 6,905,638 (US) 7,651,641 (US)	<a href="#">5 Apr 2017</a>	yes; royalty-free	5 Apr 2017
C57.147 and C57.155	Cooper Power Systems, LLC	<b>Alan Yerges, Engineering - Power Systems Division IP</b> email: alanpyerges@eaton.com	PI 9612097-5	<a href="#">5 Apr 2017</a>	NO	5 Apr 2017

C57.162	IntellPower Pty Ltd	Oleg Roizman - Principal, Innovations & Digital Transformation, 10 Warina Road, Carnegie, Victoria, Australia, tel: +61-oleg.roizman@intellpower.com,	10,101,313 B2 (US)	<a href="#">13 Nov 2021</a>	yes	15 Nov 2021
C57.163	Advanced Power Technologies, LLC	<b>Gary Hoffman - Managing Member</b> email: grhoffmann@advpowertech.com	20130285671 (US)	<a href="#">5 May 2014</a>	yes	5 May 2014
C57.167	ZTZ Services International	Daniel Berler - CEO, 15371 NE 21st Avenue, Miami FL 33162, tel: +1-612-berlerdaniel@ztzservices.us, URL:	not indicated	<a href="#">23 Apr 2021</a>	yes	23 Apr 2021

Respectfully submitted,



Ed teNyenhuis  
Chair, IEEE PES Transformers Committee  
Rev. 0, March 11, 2022

## 5 VICE-CHAIR'S REPORT – DAVID WALLACH

The Vice-Chair's Report will be 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](http://www.ieee-pes.org) for further details, and additional events.

- [2022 IEEE PES Transmission and Distribution Exhibition and Conference April 25 - 28, 2022, New Orleans, LA](#)
- [2022 IEEE PES General Meeting](#)  
July 17 - 21, 2022, Denver, Colorado
- 2023 IEEE PES General Meeting  
July 16 - 20, 2023, Orlando, Florida

### 5.2 2022 IEEE PES TRANSMISSION AND DISTRIBUTION CONFERENCE AND EXHIBITION, APRIL 25 - 28, 2022, NEW ORLEANS, LA

#### 5.2.1 Conference Theme

The weblink is <https://ieeet-d.org/>

The theme of the conference is *Power in Discovery*.

#### 5.2.2 Conference Paper Submittals

The paper submission period opened to authors on July 8, 2021 and closed on August 15, 2021. Papers were then distributed to various Technical Committees for peer review based upon the paper content. The

Transformer Committee peer review process ended on October 28, 2021. Below is a summary of the final paper reviews:

Total Submissions ..... 14  
 Accepted ..... 10  
 Rejected ..... 4

*Below are the conference papers accepted (transaction and conference)*

Paper	Title	Type
2022TD0033	How to Improve IEEE C57.104-2019 DGA Fault Severity Interpretation	Conference
2022TD0042	Resilient substations – concepts and applications	Conference
2022TD0053	Innovative Condition Monitoring Solutions Using Integrated Sensing Enabled by a New Generation of Dry Type Insulation Technologies	Conference
2022TD0076	Introduction of Clean Air Insulation for High Voltage Instrument Transformers	Conference
2022TD0120	Evaluation of GIC Thermal Capability of Power Transformers – Part I: Core Form Transformers	Conference
2022TD0121	Evaluation of GIC Thermal Capability of Power Transformers – Part II: Shell Form Transformers	Conference
2022TD0147	Power flow control of carbon-neutral energy to industrialized urban areas	Conference
2022TD0156	Thermal Class of Thermally Upgraded Kraft Insulation in Synthetic and Natural Ester Liquids	Conference
2022TD0181	Improved Gyrator-Capacitor Modeling of Magnetic Circuits with Inclusion of Magnetic Hysteresis	Conference
2022TD0026	Assessment of In-Service Synthetic Ester Filled Transformers at 33 kV and Below	Transaction

### 5.2.3 Panel Sessions

There have been 3 panel sessions proposed for the Transformers Committee activities and two of them have been approved. The 3rd panel was not approved in time and has been moved to the 2022 GM.

The approved panels are:

- “Dual Nameplate kVA Distribution Transformers”, Phil Hopkinson, Dan Mulkey, Kevin Rapp, Al Traut, Steven Rosenstock, Tom Prevost
- “Significant revisions made to C57.104, the IEEE Guide for the Interpretation of Gases Generated in Mineral Oil-Immersed Transformers”, Scott Reed, David Wallach, Ed teNyenhuus

### 5.2.4 Tutorial Sessions

One tutorial session was approved:

- “Digital condition-based Asset Management Systems” by Markus Stank, Alexei Babizki, Thorsten Krüger and Bastian Auerbach.

### 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. The number of offers received to review papers was tremendous.

Tauhid Ansari  
Steve Antosz  
Claude Beauchemin  
Enrique Betancourt  
Daniel Blaydon  
Ali Cheema  
Marc Foata  
George Frimpong  
Eduardo Garcia  
Jack Harley  
Gary Hoffman  
Philip Hopkinson  
Akash Joshi  
Sheldon Kennedy  
Zan Kiparizoski

Vijayan Krishnamurthy  
Raja Kuppaswamy  
Weijun Li  
Xose Lopez-Fernandez  
Kumar Mani  
Sue McNelly  
Ross McTaggart  
Ali Naderian  
Shankar Nambi  
Poorvi Patel  
Christoph Ploetner  
Tom Prevost  
Bob Rasor  
Scott Reed  
Diego Robalino

Zoltan Roman  
Alan Sbravati  
Ewald Schweiger  
Jin Sim  
Kenneth Skinger  
Mike Thibault  
Jim Thompson  
Kiran Vedante  
Dharam Vir  
Joe Watson  
Bruce Webb  
Drew Welton  
Kris Zibert  
Waldemar Ziomek

## 5.3 2022 IEEE PES GENERAL MEETING, JULY 17 - 21, 2022, DENVER, COLORADO

### 5.3.1 Conference Theme

The weblink for the event is <http://pes-gm.org>

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 Oct 1, 2021 and closed on Nov 22, 2021. Papers were then distributed to various Technical Committees for peer review based upon the paper content. The Transformer Committee peer review process ended on Feb 14, 2022. Below is a summary of the final paper reviews:

Total Submissions ..... 5  
Accepted ..... 3  
Rejected ..... 2

*The number of accepted papers is set by the PES Technical Council (target is 50%).*

*In addition, there was 1 transactions paper which is automatically accepted and does not require a peer review (not included in the numbers above).*

*Below are the conference papers accepted (transaction and conference)*

Paper	Title	Type
22PESGM1144	An Approach for Identification of Inter-Turn Fault Location in Transformer Windings using Sweep Frequency Response Analysis	Transaction
22PESGM1440	Persistence of Excitation in an Online Monitoring of Transformer Conference Paper	Conference
22PESGM1590	Impact of Load Tap Changer Control Operation Under Microgrid Conditions	Conference

Paper	Title	Type
22PESGM1826	Accurate Calculation of VAR Demand for a fleet of Power Transformers	Conference

### 5.3.3 Panel Sessions

One panel session has been approved for the Transformer Committee activities:

- Impact of Geomagnetically Induced Current (GIC) on Power Transformers and Power Systems”, Ramsis Girgis, Mark Olson, Krishnat Patel, Ashley Commander, Thomas Hartmann, Anastasia O’Malley, Chris Pilch, Gary Hoffman and Dan Blaydon. Tutorial Sessions

### 5.3.4 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. The number of offers received to review papers was tremendous.

Tauhid Ansari  
Yang Baitun  
Marc Foata  
Eduardo Garcia  
John Herron  
Phil Hopkinson  
John John

Zan Kiparizoski  
Axel Kraemer  
Weijun Li  
Darell Mangubat  
Poorvi Patel  
Chris Ploetner  
Pugal Selvaraj

Michael Thibault  
Jason Varnell  
David Walker  
Bruce Webb  
Drew Welton  
Igor Ziger

Respectfully submitted,  
David Wallach  
Vice-Chair  
March 7, 2022

## 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](#) | 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 2021 Administrative Subcommittee meeting, four new committee member applications were submitted for consideration. All four applications were approved. The new members are listed in the following table.

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Darrell Mangubat IEEE – Yes PES – Yes SA – Yes	Siemens Energy	Ajith Varghese Dielectric Test SC 2 yrs.	Scott Digby WG PC57.169 2 yrs.	Mike Spurlock WG PC57.143 2 yrs.	Consumer
Colby Lovins IEEE – Yes PES – Yes SA – Yes	Federal Pacific	Casey Ballard Dry Type SC 3 yrs.	David Walker WG PC57.12.91 3 yrs.	Joseph Tedesco WG PC57.12.52 14 months	Producer
Gilles Bargone IEEE – Yes PES – Yes SA – Yes	FISO Technologies	Sam Sharpless Insulation Life SC 3 yrs.	Mark Tostrud WG PC57.165 3 yrs.	Scott Digby WG PC57.169 2 yrs.	Producer
Joseph Tedesco IEEE – Yes PES – Yes SA – Yes	Hitachi Energy	Casey Ballard Dry Type SC 4+ yrs.	David Walker WG PC57.12.91 4+ yrs.	David Stankes 259 2+ yrs.	Producer

#### 6.1.2 New Member Applications

One new application for Committee Membership was received for consideration since the last Administrative Subcommittee meeting. The following table lists the name of the applicant and a summary of their supporting eligibility information.

Name	Affiliation	Sponsor #1	Sponsor #2	Sponsor #3	Membership Category
Timothy Raymond IEEE – Yes PES – Yes SA – Yes	Electric Power Research Institute	Samuel Sharpless Insulation Life SC 2 yrs.	David Wallach WG PC57.91 2 yrs.	Kumar Mani WG PC57.170 2 yrs.	General Interest

### 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). Based on the level of participation, the committee administrative staff will upgrade the participation status to “Active Participant” when appropriate. The Committee Member status, however, can only be attained through a formal application with the sponsorship of a minimum of three WG or SC Chairs, at least one of which must be a SC Chair. Details of the application requirements and approval process by the Administrative Subcommittee are outlined in our O&P manual.

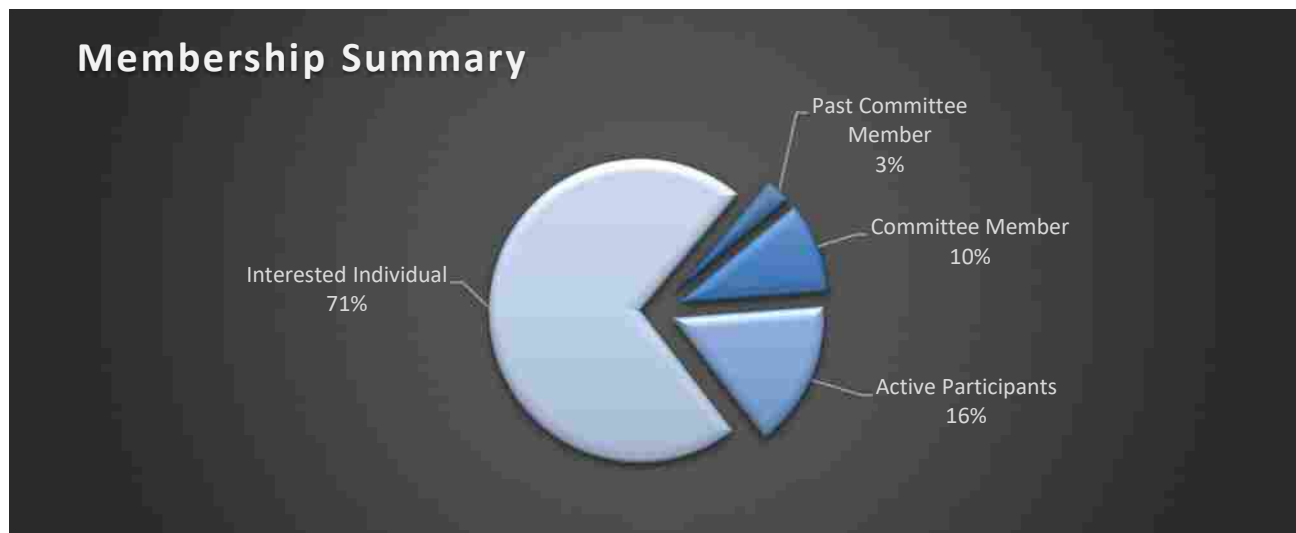
The following table contains a count of the participants grouped by the four general categories (CM totals do not include those requesting membership at this meeting or Members to be moved to Past Member Status).

<i>Membership Status</i>	F16	S17	F17	S18	F18	S19	F19	S20	F20	S21	F21*	S22**
<i>Interested Individual</i>	1507	1554	1550	1552	1551	1582	1632	1579	1563	1611	1581	1596
<i>Interested Individual - IEEE Life Member</i>	11	11	11	13	12	12	12	11	12	12	12	12
<b>Total Interested Individuals</b>	<b>1520</b>	<b>1565</b>	<b>1561</b>	<b>1565</b>	<b>1563</b>	<b>1594</b>	<b>1644</b>	<b>1590</b>	<b>1575</b>	<b>1623</b>	<b>1593</b>	<b>1608</b>
<i>Active Participant</i>	258	275	302	321	324	349	362	365	362	360	350	348
<i>Active Participant - IEEE Life Member</i>	5	5	5	5	5	6	7	6	6	6	6	6

<i>Membership Status</i>	F16	S17	F17	S18	F18	S19	F19	S20	F20	S21	F21*	S22**
<b>Total Active Participants</b>	<b>263</b>	<b>280</b>	<b>307</b>	<b>326</b>	<b>329</b>	<b>355</b>	<b>369</b>	<b>371</b>	<b>368</b>	<b>366</b>	<b>356</b>	<b>354</b>
<b>Committee Member</b>	<b>175</b>	<b>180</b>	<b>169</b>	<b>175</b>	<b>181</b>	<b>191</b>	<b>182</b>	<b>179</b>	<b>179</b>	<b>173</b>	<b>175</b>	<b>173</b>
<b>Committee Member – Emeritus</b>	<b>9</b>	<b>9</b>	<b>9</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>10</b>	<b>11</b>	<b>11</b>	<b>11</b>	<b>12</b>	<b>12</b>
<b>Committee Member - IEEE Life Member</b>	<b>27</b>	<b>29</b>	<b>28</b>	<b>33</b>	<b>33</b>	<b>33</b>	<b>32</b>	<b>33</b>	<b>33</b>	<b>32</b>	<b>33</b>	<b>35</b>
<b>Total Committee Members</b>	<b>211</b>	<b>218</b>	<b>206</b>	<b>216</b>	<b>224</b>	<b>234</b>	<b>224</b>	<b>223</b>	<b>223</b>	<b>216</b>	<b>220</b>	<b>220</b>
<b>Past Committee Member</b>	<b>31</b>	<b>30</b>	<b>42</b>	<b>38</b>	<b>38</b>	<b>38</b>	<b>50</b>	<b>48</b>	<b>48</b>	<b>59</b>	<b>56</b>	<b>53</b>
<b>Past Committee Member - IEEE Life Member</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>6</b>	<b>6</b>	<b>6</b>	<b>8</b>	<b>12</b>	<b>10</b>	<b>12</b>	<b>12</b>	<b>12</b>
<b>Total Past Committee Members</b>	<b>36</b>	<b>35</b>	<b>49</b>	<b>44</b>	<b>44</b>	<b>44</b>	<b>58</b>	<b>60</b>	<b>58</b>	<b>71</b>	<b>68</b>	<b>65</b>
<b>TOTAL IN AMS DATABASE</b>	<b>2028</b>	<b>2098</b>	<b>2123</b>	<b>2151</b>	<b>2160</b>	<b>2227</b>	<b>2295</b>	<b>2244</b>	<b>2224</b>	<b>2276</b>	<b>2237</b>	<b>2247</b>

\*F21 data as of October 3, 2021

\*\*S22 data as of December 31, 2021



## 6.2 COMMITTEE, SUBCOMMITTEES, AND WORKING GROUP ROSTERS

In order to provide indemnification to working group and subcommittee members it is crucial that membership lists be maintained. The AM system has these functions built-in to ease these administration



tasks. It is important that each subcommittee and working group chair keep the rosters updated so that this information can be provided to the IEEE SA.

A similar main committee roster has also been developed to track attendance for the Main Committee General Session meeting on Monday & Thursday. The data 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 October 2020 prior to the Fall 2020 Virtual Meeting. Changes to the Committee Membership statuses were reported in the Spring 2021 Secretary's Report. The next scheduled audit for membership requirements in accordance with the Committee P&P will be in 2022 (IEEE-PES and IEEE-SA). Past Committee Members can be reinstated to Committee Members if their status changes and they are able to regularly participate within two years of being changed to Past Committee Member.

### **6.5 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 Transformer 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 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 2021 meeting have been posted to the committee website. Thank you to everyone for submitting their minutes in a prompt fashion.

Subcommittee Chairs are asked to submit their respective subcommittee meeting minutes for the Spring 2022 meeting held in Denver, CO to the Committee Secretary no later **May 13, 2022**, 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 6, 2022

## **7 TREASURER'S REPORT – TROY TANAKA**

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

The Treasurer's Report is included as **Appendix 8**.

## **8 STANDARDS REPORT – STEVE SHULL**

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The Standard Report was presented at the Monday General Session.

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

## **9 LIAISON REPORTS**

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### **9.1 CIGRE – CRAIG SWINDERMAN**

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

### **9.2 IEC TC-14 – CHRISTOPH PLOETNER**

Christoph Ploetner presented an overview of TC14 activities. His presentation is available in **Appendix 4**.

### **9.3 STANDARDS COORDINATING COMMITTEE NO. 4 (ELECTRICAL INSULATION) – EVANNE WANG (NOT PRESENT) – UPDATE BY BRUCE FORSYTH**

Evanne Wang was not present so the Chair presented the update. The presentation is available in **Appendix 5**.

## **9.4     ASTM – TOM PREVOST (NOT PRESENT – UPDATE BY BRUCE FORSYTH)**

Tom Prevost presented an overview of ASTM D27 activities. His presentation is available in **Appendix 6**.

## **9.5     TRANSACTIONS POWER DELIVERY (XOSE LOPEZ-FERNANDEZ)**

Xose Lopez-Fernandez presented an overview of Transaction Power Delivery activities. His presentation is available in **Appendix 7**.

## **9.6     HOT TOPICS FOR THE UPCOMING WEEK**

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

### **9.6.1     Power Transformers Subcommittee, Ryan Musgrove**

C57.116 – the WG plans to finalize and approve the document to go to ballot.

C57.17 Arc Furnace Transformers – experts to help revise the document are needed.

IEEE 638 – Class 1E Nuclear Transformers - experts to help revise the document are needed.

### **9.6.2     Dry Type Subcommittee, Casey Ballard**

Newly approved PARs for C57.12.01, C57.12.91, C57.94.

### **9.6.3     Insulation Life Subcommittee, Sam Sharpless**

C57.162 WG, guide for moisture in insulation, has no more extensions and needs to complete work, need to get a ballot initiated since running out of time.

### **9.6.4     Dielectric Test Subcommittee, Poorvi Patel**

A new task force was formed for core ground and insulation resistance.

The guide for routine impulse test for distribution transformers is expiring.

### **9.6.5     Bushing Subcommittee, Scott Digby for**

A new joint IEC-IEEE WG for HVDC bushing standard development was formed.

### **9.6.6     Instrument Transformers, Thomas Sizemore**

C57.13 – first meeting to revise the document.

### **9.6.7     Subsurface Transformers and Network Protectors, George Payrle**

WG formed for corrosion mitigation.

### **9.6.8     HVDC Transformers, Ulf Radbrant**

Monitoring of HVDC Transformers is a current topic.

## **9.7 NEW BUSINESS**

There was no new business brought before the committee.

## **9.8 OPENING SESSION ADJOURNMENT**

The meeting adjourned with motion by Dan Sauers and seconded by Eduardo Garcia Wild at 9:15 AM.

## Thursday Closing Session

# 10 CHAIR'S REMARKS AND ANNOUNCEMENTS

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

The Agenda was reviewed and approved on Monday.

The chair recognized that this was a great first in person meeting since 2019. He also noted that achieving quorum was a challenge so all need to support the activity leaders in upcoming votes that will be made by email to help complete unfinished business. Groups should complete actions promptly. Any email bounce backs should be communicated to [gwanderson@ieee.org](mailto:gwanderson@ieee.org) to help keep the member database current while we transition to Memberplanet.

Tammy Behrens was appointed for another 3-year term as Chair of the Meetings Subcommittee.

# 11 MEETINGS PLANNING SC MINUTES & REPORT – TAMMY BEHRENS

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See Appendix 6.

Xcel Energy and host Jeff Gragert and team were thanked for hosting the meeting. The meeting attendance was reviewed. There were 385 attendees in comparison to the last in-person meeting in Fall 2019 with 603 attendees.

The Meetings Subcommittee is comprised of the following positions

- Tutorials: Tom Prevost
  - Break Sponsors: Ed Smith
  - Website: Sue McNelly ([spmcnelly14@gmail.com](mailto:spmcnelly14@gmail.com))
  - Mobile App: David Wallach
  - Meeting Schedule: Jerry Murphy
  - New AMS: Greg Anderson & Jim McBride
- 
- Registration Desk, Etc.: Jennifer Quandt, HPN

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

FALL 2022 — October 16-20

Charlotte, North Carolina USA

Sheraton / Le Méridien, **HOTEL BLOCK IS OPEN – LINK ON WEBSITE**

SPRING 2023 — March 19-23  
Milwaukee, WI USA  
Hyatt Regency

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.

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

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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**

- C57.19.00 – Draft considered complete.
  - (PAR expires 12/2022)
- C57.19.02 – Currently being balloted. Closes 4/2/2022.
  - (PAR expires 12/2022)
- C57.19.100 – Draft essentially considered complete.
  - (PAR expires 12/2023)
- P65700-19-03 – IEC/IEEE – Bushings for DC Applications
  - New activity. Would benefit from additional utility/user involvement
- Liaison activity - IEEE 693 (Seismic Design of Substations) – Expected to go to ballot in a few months.
  - IEEE PES >>> Substations

### **12.2 DIELECTRIC TESTS POORVI PATEL**

- Meeting started 30 March @11.00 am

- Quorum was not reached- 74(154) members present, 70 guests
- TF on Core Ground & Winding Insulation Resistance had its first meeting- scope was discussed
- TF C57.138- Recommended Practice for Routine Impulse Tests had its first meeting- Scope and Purpose will be email approved and Par initiated
- TF Revision to Low Frequency Test- 2 surveys performed (Class 1 PD test and PD Test Limits) and comments reviewed.
- Par extension may be needed for C57.200, C57.168 and C57.98
- C57.160 PD in Bushings/PTs/CTs – working hard to be completed in 2022

Old business- Survey PD in Bushings – Return to TF to address comments

### **12.3 DISTRIBUTION TRANSFORMERS ED SMITH (JOSH VERDELL REPORTING)**

- PC57.167 – Moved to ballot during this meeting
- C57.12.20 – In development – intend to move to ballot next meeting
- C57.12.28, .29, .30, .31, & .32 – In development
- C57.12.35 - In development – intend to move to ballot next meeting
- C57.12.34 – Resolving Ballot Comments
- C57.12.38 – In development – intend to move to ballot next meeting

TF Transformer Efficiency & Loss Evaluation – Continued work

### **12.4 DRY TYPE TRANSFORMERS CASEY BALLARD**

- C57.16 – Approved to proceed to SA ballot
- C57.12.52 – Approved to proceed to SA ballot
- C57.12.01 – First WG meeting, aligned on topics for revision
- C57.134 – Approved to proceed to SA ballot
- 259 – Discussion on RTI versus TI
- C57.94 – First WG meeting, assigned sections of guide for review
- C57.96 – Reviewed equations and edited to match C57.12.91
- C57.124 – Reviewed introduction, plan to go to ballot after Fall 22
- C57.12.91 – First WG meeting, aligned on topics for revision
- C57.12.59 – approved PAR for submission



## **12.5 TRANSFORMER AND REACTORS FOR HVDC APPLICATIONS    ULF RADBRANDT**

- IEC/IEEE 60076-57-129 - Transformers for HVDC applications - Published 2017 – No active PAR
- IEEE 1277 - Smoothing Reactors and Converter Reactors for DC Power Transmission - Published 2020 – No active PAR

## **12.6 INSTRUMENT TRANSFORMERS    THOMAS SIZEMORE**

- C57.13 – Held the initial meeting on Tuesday. Comments solicited for changes to be made and a discussion of possible TFs was discussed.
- IEC-IEEE 63253-5713-8 – Standard Requirements for Station Service Voltage Transformers. Approaching the balloting phase for both organizations.
- C57.13.9 – Standard for Power-line Carrier Coupling Capacitors and Coupling Capacitor Voltage Transformers. Expected to be in the balloting stage within a month.
- TF on IT accuracy – Met and continues to develop recommendations for inclusion in the next version of C57.13.

## **12.7 INSULATING FLUIDS    SCOTT REED**

- WG C57.130-First WG Meeting. Evaluating to include ester liquids, high temp designs, overload tests, separating CH<sub>4</sub> from analysis and guides for different cooling modes (ONAN, ONAF, etc...).
- WG C57.139-Evaluating to include ester liquids, a DGA database by model type, the use of C57.104 as a template for establishing limits and Duval Triangle utilization.
- WG C57.146-Presented DGA data for Silicone filled transformers and analyzing the best format to develop threshold standards similar to C57.104.
- WG C57.155- Focused on collecting DGA data to develop threshold standards similar to C57.104.
- WG C57.166- Will need a PAR extension. In final stages of developing tables so a draft document can be prepared.
- WG C57.637- Reviewed modifications to the guide and held discussions about processing ester fluids.

## **12.8 INSULATION LIFE    SAM SHARPLESS**

- C57.162 – The subcommittee voted and approved to send the document to ballot.
- C57.100 – The subcommittee voted and approved to send the document to ballot

## **12.9 PERFORMANCE CHARACTERISTICS      ROGERIO VERDOLIN**

- WG C57.149: In Development  
  
Revision is completed; grounding, connections, and analysis. Ready for WG straw ballot. PAR expires this year.
- TF PCS C57.12.00: In Development  
  
Inclusion of Core information on Nameplate
- TF PCS Audible Sound C57.12.00 and Clause 13 C57.12.90: In Development
- WG PC57.136: In Development
- TF PCS C57.12.90: In Development
- WG C57.142: Draft 10 is Under Ballot (Closes April 21, 2022)

WG PC57.32.10: C57.32.10 – Entity Oversight: In Development

## **12.10 POWER TRANSFORMERS      RYAN MUSGROVE**

- PAR Study Group C57.17 Arc Furnace Transformers – requested volunteers - Need experienced users/manufacturers – [ryan.musgrove@ieee.org](mailto:ryan.musgrove@ieee.org)
- PAR Study Group C57.93 – Reviewing standard Plan to have proposal ready at the fall meeting
- C57.116 GSU Transformers – Motion made to submit draft 3 to SA Ballot and passed unanimously
- C57.125 – under revision and on schedule
- C57.131 – Extra Saturday Meeting, making good progress, draft 1.1
- C57.143 – conducting straw ballot, plan to request ballot at fall meeting
- PAR Study Group C57.135 – Motion made with proposed PAR and approved unanimously, will meet as WG in Fall
- C57.150 – PAR Expires Dec 2023, Draft 2 sent to WG members for review, plan to meet remotely to be ready to request approval at fall meeting for ballot.
- C57.170 - Will conduct straw ballot on working sections and plan to complete other draft sections in fall
- C57.107 V/Hz– Working on first draft, requesting volunteers to join WG with experience
- PAR Study group IEEE 638 Xfmrs for Nuclear Stations – Expires 12/31/2023 – Need volunteers [ryan.musgrove@ieee.org](mailto:ryan.musgrove@ieee.org)
- Liaison PC57.93a – Testing being performed in China on cold start of ester fluids, no data shared yet
- PAR Study Group C57.153 Paralleling guide – volunteers gathered, plan to meet in fall

- PAR Study Group C57.156 – volunteers requested, plan to meet in Charlotte
- PAR Study group C57.157 – volunteers requested, plan to meet in Charlotte

### **12.11 STANDARDS            DAN SAUER**

- C57.12.00 – Published and new PAR started
- C59.12.90 – Published and new PAR started
- C57.12.80 – Making good progress. PAR expires 2023.
- C57.152 – In process. Working toward completion in 2023.
- C57.163 – In process. First in person meeting. PAR good through 2024.

### **12.12 SUBSURFACE TRANSFORMERS & NETWORK PROTECTORS    GEORGE PAYERLE**

- C57.12.23 Single ph submersibles, not meeting at this time
- C57.12.24 Three ph submersibles, work completed, getting ready to go to ballot
- C57.12.40 Secondary network transformers. Work continued on the spec. They will be asking for a 2 year Par extension.
- C57.12.44 is in ballot and not meeting at this time
- PC57.12.53 WG Guide on mitigating corrosion on subsurface transformers. This was their first WG meetings. WG officers are Will Elliott, chair; Avijit Shingari, vice chair, and Audrey Siebert-Timmer, secretary.

## **13    ADDITIONAL REPORT FROM THE STANDARDS COORDINATOR**

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This report provides an opportunity to present standard development issues from the week. Please see the Standards Coordinator's report for details.

## **14    NEW BUSINESS**

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No new business items were brought up.

## **15    CLOSING SESSION ADJOURNMENT**

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The meeting was adjourned at approximately 12 PM.

## 16 RECOGNITION AND AWARDS REPORT – BRUCE FORSYTH

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### 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

I am pleased to announce that since our last meeting there have been no reports of the passing away of past Committee members.

### 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	

### 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](http://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:

**Tim Raymond** – Electric Power Research Institute (EPRI)

## 16.5 GENERAL SERVICE AWARDS

### 16.5.1 Certificate of Appreciation – Meeting Host

The Transformers Committee awards thanks **Xcel Energy** for serving as the Host Company for the Spring 2022 meeting. In addition, the Comment thanks **Jeff Gragert** for his dedicated service as Host for the meeting.

### 16.5.2 Certificate of Appreciation – Outgoing Subcommittee Chair

The Transformers Committee thanks the following individuals for completing a 5-year term as Subcommittee Chair:

**Bill Griesacker** – Power Transformers Subcommittee

**Ajith Varghese** – Dielectric Test Subcommittee

## 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 working groups and task forces active. Each of these is composed of volunteers willing to dedicate their personal time and skills to help develop or improve a standard, guide, or recommended practice that helps ensure the best performance and reliability of transformers covered under the Committee's scope. Subject to the requirements outlined in the *Policies and Procedures for Standards Development for the Transformers Committee* and the *Policies and Procedures for: Transformers Committee's Working Groups (Individual Method)* participants can join as many of the development activities as they desire.

A recent review of recorded participation records indicates that approximately 75% of active participants have participated in 10 or fewer development activities. However, 3 people (about 0.3% of active participants) have participated in 36 or more development activities.

The Transformers Committee awards the following individuals an Outstanding Service Award for longstanding commitment and participation in Committee activities:



## 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 C57.12.00™-2021 – IEEE Standard for General Requirements for Liquid-Immersed Distribution, Power, and Regulating Transformers

WG Chair: Steve Snyder

Certificates of Appreciation: Stephen Antosz, Phil Hopkinson, Ajith Varghese, Eric Davis, Bill Griesacker, David Walker, Ramsis Girgis, Steve Shull, Rogerio Verdolin, Tauhid, Ansari

### 16.7.2 IEEE Std C57.12.90™-2022 – IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers

WG Chair: Stephen Antosz

Plaques: Ajith Varghese, Bertrand Poulin, Hakan Sahin, Bill Griesacker

Certificates of Appreciation: Jerry Murphy, Pierre Riffon, Sheldon Kennedy, Vinal Mehrotra, Peter Balma, Ramsis Girgis, Steve Snyder, Tauhid Ansari, Phil Hopkinson, Rogerio Verdolin.

### 16.7.3 IEEE Std C57.164™-2021 – IEEE Guide for Establishing Short-Circuit Withstand Capabilities of Liquid-Filled Power Transformers, Regulators, and Reactors

WG Chair: Sanjay Patel

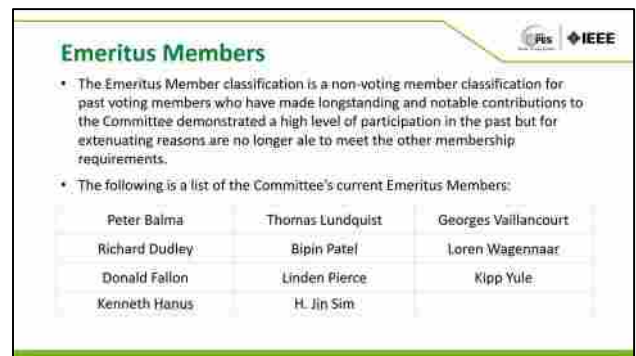
WG Vice Chair: Raj Ahuja

WG Secretary: Joe Watson

Certificate of Appreciation: Jane Vernor

## 16.8 PRESENTATION SLIDES

This report was presented at the Spring 2022 Awards Luncheon in PowerPoint format. The following slides were presented:





## 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.ieee-pes.org/transformers](https://www.ieee-pes.org/transformers)*).
- The Administrative Subcommittee reviewed and approved the following membership application at its March 22, 2022 meeting:

**Tim Raymond** – Electric Power Research Institute (EPRI)

*Welcome to the Transformers Committee!*



## Certificates of Appreciation

### Meeting Host

## Certificates of Appreciation

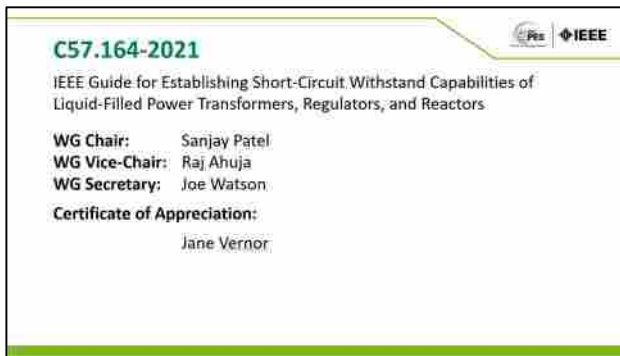
**Bill Griesacker**  
for his past service as  
**Chair of the Power Transformers Subcommittee**

## Certificates of Appreciation

**Ajith Varghese**  
for his past service as  
**Chair of the Dielectric Test Subcommittee**







Respectfully submitted,

Bruce Forsyth  
 Past Chair and Awards Chair, IEEE PES Transformers Committee  
 Rev. 0, August 3, 2022

## 17 ADMINISTRATIVE SUBCOMMITTEE – ED TENYENHUIS

The Administrative Subcommittee met virtually on March 22, 2022. 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. Introductions were made of guests.

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 .....	Ed Smith
Dry Type Transformers .....	Casey Ballard
Instrument Transformers.....	Thomas Sizemore
Insulation Life .....	Sam Sharpless
Performance Characteristics .....	Rogério Verdolin
Power Transformers .....	Ryan Musgrove
Standards .....	Dan Sauer
Underground Transformers & Network Protectors .....	George Payerle
Meetings .....	Tammy Behrens
Guests: Malia Zaman, Peter Balma	

Affiliation Changes: Troy Tanaka (Burns and McDonnell), Poorvi Patel (EPRI) and Ryan Musgrove (OGE) are first time ADCOM attendees.

## 17.2 APPROVAL OF PREVIOUS MEETING MINUTES

The Chair requested if there were comments on the draft Fall 2021 Administrative Subcommittee meeting minutes. Without comments received, the Fall 2021 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. There were no objections to approval of the revised agenda, therefore the below agenda was approved.

### Approved Agenda:

1. **Administrative Topics (:15)** .....Ed teNyenhuis ..... 3:00
  - 1.1. Introductions and Attendance
  - 1.2. Affiliation Change Updates
  - 1.3. Review and Approval of the Agenda
  - 1.4. Approval of Fall 2021 Minutes
2. **Officer Reports**..... 3:15
  - 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**..... 4:05

3.1.	IEEE Staff Update (:10).....	Malia Zaman	
4.	<b>Meeting Planning Report</b> .....		4:15
4.1.	Meeting Planning Report (:05) .....	Tammy Behrens	
5.	<b>Subcommittee Reports</b> ( <i>please limit your report to 4 minutes or less</i> ).....		4:20
5.1.	Bushings.....	Eric Weatherbee	
5.2.	Dielectric Test .....	Poorvi Patel	
5.3.	Distribution Transformers .....	Ed Smith	
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.....	Rogerio Verdolin	
5.10.	Power Transformers .....	Ryan Musgrove	
5.11.	Standards .....	Dan Sauer	
5.12.	Subsurface Transformers & Network Protectors .....	George Payerle	
6.	<b>Unfinished Business</b> .....		5:10
6.1.	Update on new AMS System (:10).....	Ed teNyenhuis	
6.2.	SCC04 – Proposal to absorb activities into Transformers Comm. (:10).....	Ed teNyenhuis	
6.3.	Publication of the Next Digital CD (:05).....	Peter Balma	
6.4.	Other (:05) .....	All	
7.	<b>New Business</b> (:10) .....		5:40
7.1	Proposed TC member discount for 2022 Standards PDF bundle	Peter Balma	
8.	<b>Wrap Up &amp; Adjournment</b> .....		5:50
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.”

Bill Griesacker made a motion to approve one new member application:

- Timothy Raymond, Electric Power Research Institute, General Interest

David Wallach seconded the motion. The new member application was 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." Bruce Forsyth made a motion that three individuals, William Boettger, Hemchandra Shertukde, and Eduardo Garcia Wild be awarded Outstanding Service Awards for long term contributions to the committee. Dan Sauer seconded the motion. The motion passed as there was no objection to unanimous approval.

### **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. IEEE is requiring a new mandatory slide to be presented at the beginning of all standards development meetings regarding participant behavior to help prevent the possible occurrence of dominance. The slide may be distributed prior to the meeting along with the meeting agenda. It was questioned if this slide and other mandatory slides could be sent to those registered for a meeting in lieu of presenting them at each meeting. Malia will look into this possibility.

### **17.11 MEETING PLANNING REPORT – TAMMY BEHRENS**

**17.11.1** The next meetings will be in Charlotte and Kansas City.

**17.11.2** We have about 400 registered attendees for this upcoming Spring 2022 meeting as of March 22, 2022.

### **17.12 SUBCOMMITTEE REPORTS/HOT TOPICS**

Brief reports were received from all the subcommittee chairs.

### **17.12.1 Bushings Subcommittee | Eric Weatherbee**

- 17.12.1.1 C57.19.02 the new standard for distribution bushings is in the ballot process and has received 200 comments so far. The documents for PARs of 19.00 and 19.100 are both in good shape, and the remaining PAR for DC bushings is new so the work as just begun..

### **17.12.2 Dielectric Test Subcommittee | Poorvi Patel**

- 17.12.2.1 A new TF for C57.138- Recommended Practice for Routine Impulse Tests was formed with Hakan Sahin as lead. There were a lot of discussions in the fall meeting about core ground resistance limits and best practice. A TF will be initiated in the meeting to address this with the lead of Diego Robalino. All the pars are in good shape right now. Four pars expire in 2022. it is possible that one or two may need extensions to complete the work.

### **17.12.3 Distribution Transformers Subcommittee | Ed Smith**

- 17.12.3.1 I brought forward that Gary Hoffman's Working Group Guide for Monitoring Distribution Transformers PC57.167 was making good progress and Gary was doing an excellent job moving the group forward but that he was coming up on a PAR deadline on 12/31/2022. In addition, Phil Hopkinson's Task Force on Transformer Efficiency & Loss Evaluation (DOE Activity) was always heavily attended and kept the group up to date on what the DOE activities were. Also, Phil and his group was presetting both Tutorials on Thursday morning on Dual Rated Distribution Transformers.

### **17.12.4 Dry Type Transformers Subcommittee | Casey Ballard**

- 17.12.4.1 The DTS will have the following groups meeting at the Spring 2022 TC meeting: Revision of PC57.134 and Revision of PC57.16.

### **17.12.5 HVDC Converter Transformers & Reactors Subcommittee | Ulf Radbrandt**

- 17.12.5.1 We will have a presentation and discussion regarding condition monitoring of transformers with a focus on HVDC transformers. This might be incorporated in the converter transformer standard in the future.
- 17.12.5.2 Other discussions regarding future work, e.g. preventive maintenance of main HVDC equipment which also might be incorporated in our standards in the future.

#### **17.12.6 Instrument Transformers Subcommittee | Thomas Sizemore**

- 17.12.6.1 The recently formed WG to revise C57.13 will meet for the first time on Tuesday morning. This is the primary standard for the instrument transformer subcommittee and significant interest in this revision is expected. SSVT JWG: Progress continues on this IEEE/IEC JWG standard. It is nearing the balloting stage in both standards organizations. An update of the status, upcoming work, etc. is to be presented. C57.13.9: This standard on CCVTs is entering the balloting phase. PSCC is jointly revising this standard. A status update will be provided to the ITSC. TF on IT accuracy will meet to continue work on VT and CT accuracy topics. Results of this effort will be provided to the WG to revise C57.13 once completed

#### **17.12.7 Insulating Fluids Subcommittee | Scott Reed**

- 17.12.7.1 Bruce Forsyth agreed to take over the chair of C57.130, since the previous chair resigned before the last meeting. The chair of C57.146 resigned two weeks ago and the vice chair is unable to take on the role. We met last week and Paul Boman is the secretary and has graciously agreed to serve as the interim chair until a replacement can be found. The WG for C57.166 is hoping to go out to ballot soon; the PAR expires later this year

**17.12.8 Insulation Life Subcommittee | Sam Sharpless**

- 17.12.8.1 The C57.162 WG – Guide for Moisture in Insulation – is running out of time and desperately needs to complete a ballot vote in their meeting on Monday. It is critical that all members of this group be present at the working group meeting

**17.12.9 Performance Characteristics Subcommittee | Rogerio Verdolin**

- 17.12.9.1 The PCS subcommittee has 5 groups meeting, WG Guide for FRA for Liquid Filled Transformers C57.149, TF Audible Sound Revs & WG Sound Guide C57.136, TF Continuous Revisions to C57.12.00, TF Continuous Revisions to Test Code C57.12.90, and WG Sw Transients Ind by TR/Bkr Interaction PC57.142.

**17.12.10 Power Transformers Subcommittee | Ryan Musgrove**

- 17.12.10.1 The subcommittee has 7 working groups meeting in Denver, all of which have leaders planning to attend, as well as 1 PAR study group meeting. We had 3 PAR study groups recently approved for C57.153, C57.156, and C57.157, and it appears three additional active PAR study groups, two of which I believe are having difficulties finding volunteers.

**17.12.11 Standards Subcommittee | Dan Sauer**

- 17.12.11.1 Standards 12.00 and 12.90 have new PARs and as we all know work is already continuing on their new drafts.

**17.12.12 Subsurface Transformers & Network Protectors Subcommittee | George Payerle**

- 17.12.12.1 The former Corrosion task force under the Submersible Transformers and Network Protectors SC is now a working group, PC57.12.53 Guide for Mitigating Corrosion on Subsurface Transformers and Network Protectors.

**17.13 UNFINISHED BUSINESS**

- 17.13.1** Update on new AMS System: Memberplanet development is under way and it is expected to be available for use for the fall 2022 meeting, however it will most likely not have full functionality. Registration through Memberplanet is not expected to be complete for the fall meeting so registration will probably be through IEEE as was done for the spring 2022 meeting.
- 17.13.2** SCC04 – Proposal to absorb activities into Transformers Comm.: The Transformers Committee will accept the 3 documents from SCC04, if SCC04 modifies the scope of the active PAR to fall within the scope of the Transformers Committee.



- 17.13.3** Publication of the Next Digital CD: The standards CD in the past will now be called a “PDF bundle” and clarification was requested if it will be on-line use only or if standards will be downloadable for use in the field when it may not be possible to have reliable on-line connection. Malia stated that IEEE has offered a 20% discount for those registered for the spring 2022 meeting. Steve Shull made a motion that if there are no more than \$30,000.00 in losses from the spring 2022 meeting then the Transformers Committee will provide a \$110.00 discount to voting members towards purchase of the C57 pdf bundle. This was seconded by \*\*\*\*. There was no opposition to unanimous approval of the motion.

## **17.14 NEW BUSINESS**

- 17.14.1** Proposed TC member discount for 2022 Standards PDF bundle: Steve Shull made a motion that if there are no more than \$30,000.00 in losses from the spring 2022 meeting then the Transformers Committee will provide a \$110.00 discount to voting members towards purchase of the C57 pdf bundle. The motion was seconded by Dan Sauer. There was no opposition to unanimous approval of the motion.
- 17.14.2** Web domain registration renewal: Greg Anderson provided cost for 5-year and 10-year web domain registration renewal to the AdCom. There was a small discount for the 10-year renewal. Steve Shull made a motion that we proceed with the 10-year renewal at a cost of about \$760 since there are sufficient funds in the TC bank account. Dan Sauer seconded the motion. There were no objections to unanimous approval of the motion.

## **17.15 ADJOURNMENT**

The meeting was adjourned at about 6:00 PM.

Submitted by:

Bill Griesacker,  
Secretary, Transformers Committee

March 22, 2021

March 22, 2022 Adcom Meeting Attendance

<b>Last Name</b>	<b>First Name</b>	<b>Affiliation</b>	<b>Meeting Date 3/22/2022</b>
Ballard	Robert	DuPont	X
Behrens	Tammy	SPX Transformer Solutions, Inc.	X
Forsyth	Bruce	Bruce Forsyth and Associates LLC	X
Griesacker	Bill	Duquesne Light Co.	X
Payerle	George	Carte International Inc.	X
Radbrandt	Ulf	Hitachi ABB Power Grids	
Reed	Scott	MVA	X
Sauer	Daniel	EATON Corporation	X
Sharpless	Samuel	Rimkus Consulting Group	X
Shull	Stephen	BBC Electrical Services, Inc.	X
Sizemore	Thomas	ABB Inc.	X
Smith	Edward	H-J Family of Companies	X
Tanaka	Troy	Burns & McDonnell	X
teNyenhuis	Ed	Hitachi ABB Power Grids	X
Varghese	Ajith	SPX Transformer Solutions, Inc.	X
Verdolin	Rogério	Verdolin Solutions Inc.	X
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

**TUESDAY, MARCH 22**

No Events Planned

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
1:00 PM – 4:00 PM	Administrative Subcommittee - Closed meeting, by invitation only	Admin	E. teNyenhuis	–	Virtual

**SATURDAY, MARCH 26**

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

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
8:00 AM – 5:00 PM	WG Standard Requirements for Tap Changers - C57.131	Power	C. Colopy	I	Quartz (3)

**SUNDAY, MARCH 27**

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
1:00 PM – 5:30 PM	Meeting Registration				Centennial Ballroom Foyer (3)
2:00 PM – 5:00 PM	NEMA Transformers - Closed meeting, by invitation only	++	J. Stewart	–	Mineral Hall B (3)
6:00 PM – 8:00 PM	Welcome Reception Renew old friendships and form new ones! This reception will be held inside the beautiful Centennial A 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.				Centennial A (3)

## IEEE PES TRANSFORMERS COMMITTEE

3/14/2022

SPRING 2022 MEETING: MARCH 27 TO MARCH 31

Hyatt Regency Denver at Colorado Convention Center; Denver, CO USA

## MONDAY, MARCH 28 Breaks Sponsored by HV Technologies Inc.\*

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 5:00 PM	Meeting Registration				Centennial Ballroom Foyer (3)
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	–	Mineral Hall D-E-F-G (3)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Centennial A (3)
7:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Peaks Lounge (27)
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	-	Centennial D-E (3)
8:30 AM – 4:00 PM	Spouses/Companions Tour: Experience Estes Park - Advance on-line registration required - Bus departs hotel at 8:30 AM from outside hotel's main entrance and returns ~4:00 PM; includes lunch - ATTENDANCE IS LIMITED - See flyer for details	Tour			
9:15 AM – 9:30 AM	Break (beverages only): HV Technologies Inc.				Centennial Ballroom Foyer
9:30 AM – 10:45 AM	WG Dry Type Reactors PC57.16	Dry Type	A. Del Rio	I	Centennial H
9:30 AM – 10:45 AM	WG Guide of FRA for Liquid Filled Transf. C57.149	PCS	C. Sweetser	I	Mineral Hall B-C
9:30 AM – 10:45 AM	WG Standard Requirements for Tap Changers - C57.131	Power	C. Colopy	I	Centennial G
9:30 AM – 10:45 AM	WG Std Transf. Terminology C57.12.80	Stds	J. Graham	I	Centennial F
9:30 AM – 10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	I	Mineral Hall A
9:30 AM – 10:45 AM	WG Moisture in Insulation PC57.162	Ins Life	T. Prevost	I	Centennial D-E
10:45 AM – 11:00 AM	Break (beverages only): HV Technologies Inc.				Centennial Ballroom Foyer
11:00 AM – 12:15 PM	WG Overhead Distr. Transf. C57.12.20	Distr	A. Traut	I	Centennial H
11:00 AM – 12:15 PM	WG C57.116 Guide for Trfs Direct Connect to Generators	Power	W. Li	I	Centennial G
11:00 AM – 12:15 PM	WG Sealed Dry-Type Transf. PC57.12.52	Dry Type	J. Tedesco	I	Mineral Hall B-C
11:00 AM – 12:15 PM	<del>TF Partial Discharge Tests for Class I Transformers</del>	<del>DiTests</del>	<del>D. Ayers</del>	<del>I</del>	<del>Centennial D-E</del> CANCELLED
11:00 AM – 12:15 PM	WG Guide for DGA in Silicone PC57.146	IF	J. Karas	N	Mineral Hall A
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.				Centennial A (3)
1:45 PM – 3:00 PM	WG 1-ph Padmount Dist Transf. C57.12.38	Distr	A. Ghafourian	I	Centennial H
1:45 PM – 3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	N	Mineral Hall B-C
1:45 PM – 3:00 PM	WG PC57.152 Guide for Field Testing	Stds	M. Ferreira	I	Centennial F
1:45 PM – 3:00 PM	WG Partial Discharge Test - C57.113	DiTests	A. Naderian	I	Centennial G
1:45 PM – 3:00 PM	TF Audible Sound Revs & WG Sound Guide C57.136 (S. Antosz)	PCS	R. Girgis	I	Centennial D-E
1:45 PM – 3:00 PM	TF Application of High-Temp Insulation Matrs 1276 Annex B	Ins Life	K. Biggie	N	Mineral Hall A
3:00 PM – 3:15 PM	Break (beverages and treats): HV Technologies Inc.				Centennial Ballroom Foyer
3:15 PM – 4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	S. Shull	I	Mineral Hall B-C
3:15 PM – 4:30 PM	WG Transformer Monitoring C57.143	Power	M. Spurlock	I	Centennial G
3:15 PM – 4:30 PM	WG Transformer Impulse Test Guide PC57.98	DiTests	T. Hohan	I	Centennial H
3:15 PM – 4:30 PM	TF C57.134 Guide for Hottest-spot in Dry-type	Dry Type	C. Lovins	I	Mineral Hall A
3:15 PM – 4:30 PM	WG Bushing Applicat. Guide C57.19.100	Bush	T. Spitzer	I	Centennial F
3:15 PM – 4:30 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	I	Centennial D-E
4:30 PM – 4:45 PM	Break (beverages only): HV Technologies Inc.				Centennial Ballroom Foyer
4:45 PM – 6:00 PM	WG Submersible Transf. C57.12.24	STNP	B. Garcia	I	Centennial F
4:45 PM – 6:00 PM	WG Failure Investigation & Reporting PC57.125	Power	H. Sahin	N	Centennial G
4:45 PM – 6:00 PM	<del>TF Next Revision to C57.104 Guide for DGA in Mineral Oil</del>	<del>IF</del>	<del>C. Beauchemin</del>	<del>N</del>	<del>Centennial D-E</del> CANCELLED
4:45 PM – 6:00 PM	TF IEEE 259 Test for Eval of Insulation for Dry-Type Transfs	Dry Type	D. Stankes	I	Mineral Hall B-C
4:45 PM – 6:00 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	U. Radbrandt	-	Centennial H

**TUESDAY, MARCH 29 Breaks Sponsored by MIDEL\***

TIME	ACTIVITY	TRACK	MTG CHAIR	STATUS	ROOM (FLOOR)
7:00 AM – 11:30 AM	Meeting Registration				Centennial Ballroom Foyer (3)
7:00 AM – 8:00 AM	Breakfast - Attendees (no spouses/companions please)				Centennial A (3)
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Peaks Lounge (27)
10:00 AM – 12:00 PM	Spouses/Companions Tour: Zentangle Beginner Drawing Class	Tour			
	- Advance on-line registration required				
	- Class takes place at the Hyatt Regency in Quartz A-B (3)				
	- ATTENDANCE IS LIMITED - See flyer for details				
8:00 AM – 9:15 AM	TF Rises other than windings C57.12.00, Clause 5.11.1.4	Ins Life	T. Johnson	I	Mineral Hall A
8:00 AM – 9:15 AM	WG Condition Assessment Guide PC57.170	Power	K. Mani	I	Centennial G
8:00 AM – 9:15 AM	WG Station Service Volt. Transf. C57.13.8	Instr TR	D. Wallace	I	Mineral Hall B-C
8:00 AM – 9:15 AM	WG Practice for Install & Operation of Dry Type PC57.94	Dry Type	J. Medina	I	Centennial F
8:00 AM – 9:15 AM	TF - Core Ground & Winding Insulation Resistance - Perf & Int.	DiTests	D. Robalino	I	Centennial H
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	Centennial D-E
9:15 AM – 9:30 AM	Break (beverages only): MIDEL				Centennial Ballroom Foyer
9:30 AM – 10:45 AM	WG Low Frequency Test Guide PC57.168	DiTests	D. Sauer	I	Centennial F
9:30 AM – 10:45 AM	WG Transportation Issues C57.150	Power	G. Anderson	I	Centennial G
9:30 AM – 10:45 AM	TF Instrument Transf. Accuracy	Instr TR	I. Ziger	I	Mineral Hall A
9:30 AM – 10:45 AM	WG Temp Measurement PC57.165	Ins Life	M. Tostrud	I	Mineral Hall B-C
9:30 AM – 10:45 AM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	I	Centennial D-E
9:30 AM – 10:45 AM	TF Guide for the Reclamation of Mineral Oil - C57.637	IF	S. Denzer	N	Centennial H
10:45 AM – 11:00 AM	Break (beverages only): MIDEL				Centennial Ballroom Foyer
11:00 AM – 12:15 PM	WG Distrib. Transf. Bushings PC57.19.02	Bush	S. Shull	I	Centennial F
11:00 AM – 12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	D. Blew	I	Mineral Hall B-C
11:00 AM – 12:15 PM	WG Requirements for Instrument Transformers PC57.13	Instr TR	D. Wallace	I	Mineral Hall A
11:00 AM – 12:15 PM	WG Thermal Evaluation C57.100	Ins Life	R. Wicks	I	Centennial D-E
11:00 AM – 12:15 PM	WG Guide for Loading Dry Type Transformers C57.96	Dry Type	A. Narawane	I	Centennial H
11:00 AM – 12:15 PM	WG Guide for DGA Applied to Factory Temp Rise Test C57.130	IF	B. Forsyth	N	Centennial G
12:15 PM – 1:30 PM	Awards Luncheon				Centennial A (3)
	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.				
1:45 PM – 3:00 PM	WG Consolidation Insulating Fluid Guides PC57.166	IF	T. Prevost	I	Centennial F
1:45 PM – 3:00 PM	WG Bar Coding for Distr Transf. C57.12.35	Distr	R. Chrysler	I	Centennial H
1:45 PM – 3:00 PM	TF Cont. Revision to Low Frequency Tests	DiTests	B. Griesacker	I	Mineral Hall A
1:45 PM – 3:00 PM	WG Guide for Mitigating Corrosion on Subsurface Trfs	STNP	W. Elliott	N	Mineral Hall B-C
1:45 PM – 3:00 PM	TF Continuous Rev Clause 11 Temp Rise Tests C57.12.90	Ins Life	D. Sankarakurup	I	Centennial G
1:45 PM – 3:00 PM	WG Volts per Hertz C57.107	Power	J. Watson	I	Centennial D-E
3:00 PM – 3:15 PM	Break (beverages and pretzels): MIDEL				Centennial Ballroom Foyer
3:15 PM – 4:30 PM	TF C57.138- Recommended Practice for Routine Impulse Tests	DiTests	H. Sahin	E/I	Mineral Hall B-C
3:15 PM – 4:30 PM	TF Guide for Install & Maintenance of Power Trf C57.93	Power	S. Reed	N	Centennial G
3:15 PM – 4:30 PM	WG Geomagnetic Disturbances PC57.163	Stds	D. Blaydon	N	Centennial F
3:15 PM – 4:30 PM	WG Dry Type PD Detection PC57.124	Dry Type	T. Prevost	I	Mineral Hall A
3:15 PM – 4:30 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	I	Centennial D-E
3:15 PM – 4:30 PM	WG Guide DGA in Ester-Immersed Transformers PC57.155	IF	A. Sbravati	N	Centennial H
4:30 PM – 4:45 PM	Break (beverages only): MIDEL				Centennial Ballroom Foyer
4:45 PM – 6:00 PM	WG Guide for PD Measure HV Bushings & Inst Trf C57.160	DiTests	T. Hochanh	NC	Mineral Hall A
4:45 PM – 6:00 PM	WG Guide for Monitoring Distr Transf PC57.167	Distr	G. Hoffman	I	Centennial G
4:45 PM – 6:00 PM	TF Revision of Guide for DGA in LTCs C57.139	IF	R. Frotscher	N	Mineral Hall B-C
4:45 PM – 6:00 PM	WG Loading Guide PC57.91	Ins Life	D. Wallach	I	Centennial F
4:45 PM – 6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	N	Centennial H
4:45 PM – 6:00 PM	WG Bushings IEC/IEEE 65700.19.03 Dual Logo	Bush	A. Del Rio	I	Centennial D-E

**NEW WITH  
THIS REVISION**

# IEEE PES TRANSFORMERS COMMITTEE

3/14/2022

SPRING 2022 MEETING: MARCH 27 TO MARCH 31

Hyatt Regency Denver at Colorado Convention Center; Denver, CO USA

## WEDNESDAY, MARCH 30 Breaks Sponsored by DuPont\*

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)				Centennial A (3)	
7:00 AM – 8:00 AM	SC Meetings Planning - Breakfast Meeting - arrive early - All interested individuals welcome	Mtgs	T. Behrens	–	Mineral Hall C (3)	
7:00 AM – 8:30 AM	IEC TC-14 Technical Advisory Group - Breakfast Meeting - arrive early - All interested individuals welcome		P. Hopkinson	–	Mineral Hall D-E-F-G (3)	
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Peaks Lounge (27)	
8:00 AM – 9:15 AM	SC Instrument Transformers	Instr TR	T. Sizemore	–	Centennial F-G	
8:00 AM – 9:15 AM	SC Insulation Life	Ins Life	S. Sharpless	–	Centennial E (3)	
9:15 AM – 9:30 AM	Break (beverages only): DuPont					
9:30 AM – 10:45 AM	SC Distribution Transformers	Distr	E. Smith	–	Centennial F-G	
9:30 AM – 10:45 AM	SC Bushings	Bush	E. Weatherbee	–	Centennial E (3)	
10:45 AM – 11:00 AM	Break (beverages only): DuPont					
11:00 AM – 12:15 PM	SC Submersible Transf. & Network Protectors	STNP	G. Payerle	–	Centennial F-G	
11:00 AM – 12:15 PM	SC Dielectric Test	DiTests	P. Patel	–	Centennial E (3)	
12:15 PM – 1:30 PM	Lunch Break					
1:30 PM – 2:45 PM	SC Dry Type Transformers	Dry Type	C. Ballard	–	Centennial F-G	
1:30 PM – 2:45 PM	SC Power Transformers	Power	R. Musgrove	–	Centennial E (3)	
2:45 PM – 3:00 PM	Break (beverages and treats): DuPont					
3:00 PM – 4:15 PM	SC Insulating Fluids	IF	S. Reed	–	Centennial F-G	
3:00 PM – 4:15 PM	SC Performance Characteristics	PCS	R. Verdolin	–	Centennial E (3)	
4:15 PM – 4:30 PM	Break (beverages only): DuPont					
4:30 PM – 5:45 PM	SC Standards	Stds	D. Sauer	–	Centennial F-G (3)	

## THURSDAY, MARCH 31

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)				Centennial A (3)	
8:00 AM – 9:30 AM	Breakfast - Spouses/Companions (no meeting attendees please)				Peaks Lounge (27)	
8:00 AM – 9:15 AM	Technical Presentation 1 Dual Rated Distribution Transformers - Part 1 by: Phil Hopkinson, Dan Mulkey, Steven Rosenstock, Kevin Rapp, Casey Ballard, Tom Prevost and Al Traut**	Tutorial			Centennial D-E (3)	
9:15 AM – 9:30 AM	Break (beverages only)					
9:30 AM – 10:45 AM	Technical Presentation 2 Dual Rated Distribution Transformers - Part 2 by: Phil Hopkinson, Dan Mulkey, Steven Rosenstock, Kevin Rapp, Casey Ballard, Tom Prevost and Al Traut**	Tutorial			Centennial D-E (3)	
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		Centennial D-E (3)	

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

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

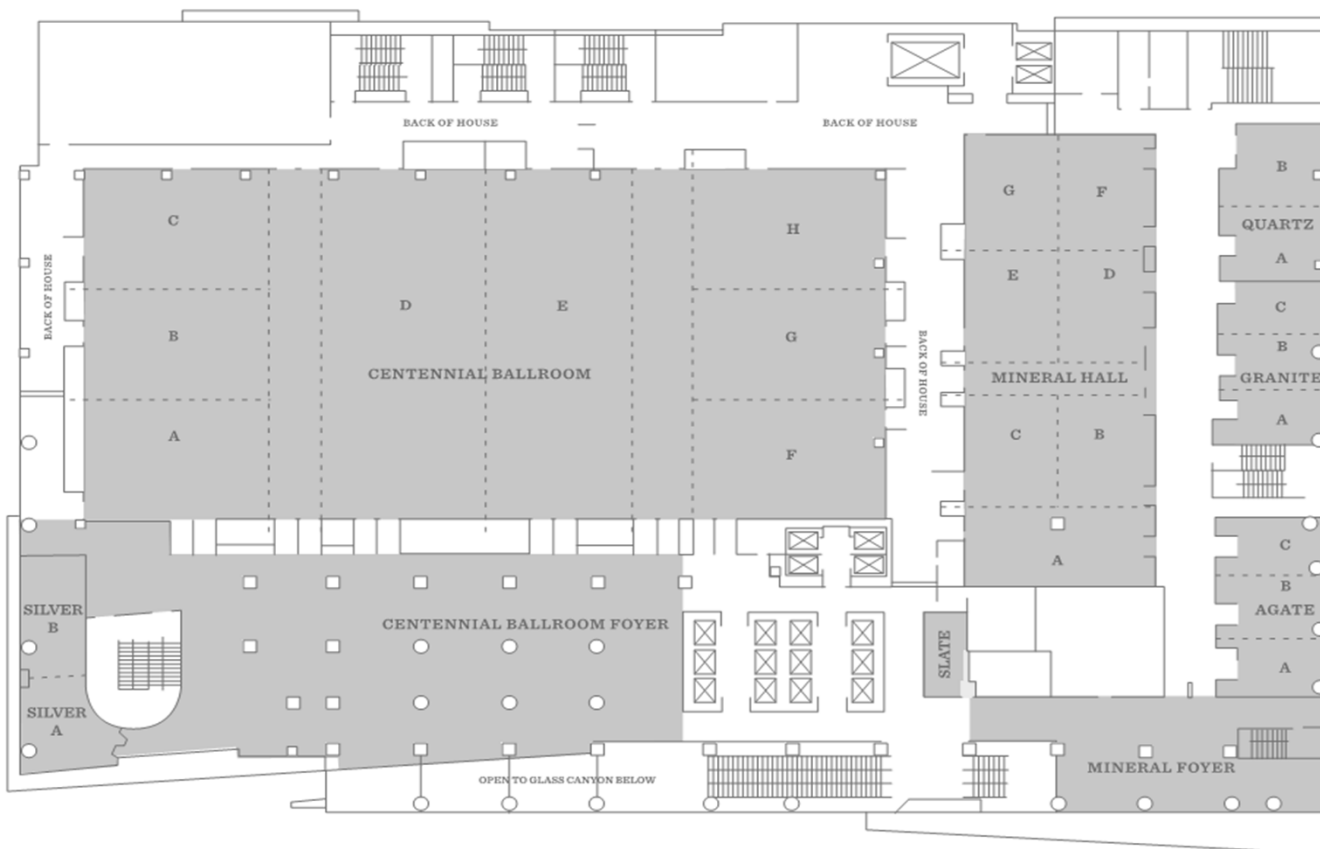
## FUTURE COMMITTEE MEETINGS

Fall 2022: Charlotte, North Carolina USA, October 16 – 20, 2022

Spring 2023: Milwaukee, Wisconsin USA, March 19 – 23, 2023

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

FLOOR PLAN  
Third Floor





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## SUBCOMMITTEE MEETING LIST

## SPRING 2022 MEETING: MARCH 27 TO MARCH 31

Hyatt Regency Denver at Colorado Convention Center; Denver, CO USA

Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
3/22/2022	1:00 PM	4:00 PM	Administrative Subcommittee - Closed meeting, by invitation only	Admin	E. teNyenhuis	Virtual
3/28/2022	3:15 PM	4:30 PM	WG Bushing Applicat. Guide C57.19.100	Bush	T. Spitzer	Centennial F
3/29/2022	11:00 AM	12:15 PM	WG Distrib. Transf. Bushings PC57.19.02	Bush	S. Shull	Centennial F
3/29/2022	4:45 PM	6:00 PM	WG Bushings IEC/IEEE 65700.19.03 Dual Logo	Bush	A. Del Rio	Centennial D-E <b>NEW</b>
3/30/2022	9:30 AM	10:45 AM	SC Bushings	Bush	E. Weatherbee	Centennial E (3)
3/28/2022	9:30 AM	10:45 AM	TF Transf Efficiency & Loss Evaluation (DOE Activity)	Distr	P. Hopkinson	Mineral Hall A
3/28/2022	11:00 AM	12:15 PM	WG Overhead Distr. Transf. C57.12.20	Distr	A. Traut	Centennial H
3/28/2022	1:45 PM	3:00 PM	WG 1-ph Padmount Dist Transf. C57.12.38	Distr	A. Ghafourian	Centennial H
3/28/2022	3:15 PM	4:30 PM	WG 3-ph Padmount Dist Transf. C57.12.34	Distr	S. Shull	Mineral Hall B-C
3/29/2022	8:00 AM	9:15 AM	WG Encl Int C57.12.28, C57.12.29, C57.12.31, C57.12.32	Distr	D. Mulkey	Centennial D-E
3/29/2022	1:45 PM	3:00 PM	WG Bar Coding for Distr Transf. C57.12.35	Distr	R. Chrysler	Centennial H
3/29/2022	4:45 PM	6:00 PM	WG Guide for Monitoring Distr Transf PC57.167	Distr	G. Hoffman	Centennial G
3/30/2022	9:30 AM	10:45 AM	SC Distribution Transformers	Distr	E. Smith	Centennial F-G
3/28/2022	11:00 AM	12:15 PM	<del>TF Partial Discharge Tests for Class I Transformers</del>	DiTests	D. Ayers	Centennial D-E <b>CANCELLED</b>
3/28/2022	1:45 PM	3:00 PM	WG Partial Discharge Test - C57.113	DiTests	A. Naderian	Centennial G
3/28/2022	3:15 PM	4:30 PM	WG Transformer Impulse Test Guide PC57.98	DiTests	T. Hochanh	Centennial H
3/29/2022	8:00 AM	9:15 AM	TF - Core Ground & Winding Insulation Resistance - Perf & Int.	DiTests	D. Robalino	Centennial H
3/29/2022	9:30 AM	10:45 AM	WG Low Frequency Test Guide PC57.168	DiTests	D. Sauer	Centennial F
3/29/2022	1:45 PM	3:00 PM	TF Cont. Revision to Low Frequency Tests	DiTests	B. Griesacker	Mineral Hall A
3/29/2022	3:15 PM	4:30 PM	TF C57.138- Recommended Practice for Routine Impulse Tests	DiTests	H. Sahin	Mineral Hall B-C
3/29/2022	4:45 PM	6:00 PM	WG Guide for PD Measure HV Bushings & Inst Trf C57.160	DiTests	T. Hochanh	Mineral Hall A
3/30/2022	11:00 AM	12:15 PM	SC Dielectric Test	DiTests	P. Patel	Centennial E (3)
3/28/2022	9:30 AM	10:45 AM	WG Dry Type Reactors PC57.16	Dry Type	A. Del Rio	Centennial H
3/28/2022	11:00 AM	12:15 PM	WG Sealed Dry-Type Transf. PC57.12.52	Dry Type	J. Tedesco	Mineral Hall B-C
3/28/2022	1:45 PM	3:00 PM	WG Dry Type Gen. Requirements C57.12.01	Dry Type	C. Ballard	Mineral Hall B-C
3/28/2022	3:15 PM	4:30 PM	TF C57.134 Guide for Hottest-spot in Dry-type	Dry Type	C. Lovins	Mineral Hall A
3/28/2022	4:45 PM	6:00 PM	TF IEEE 259 Test for Eval of Insulation for Dry-Type Transfs	Dry Type	D. Stankes	Mineral Hall B-C
3/29/2022	8:00 AM	9:15 AM	WG Practice for Install & Operation of Dry Type PC57.94	Dry Type	J. Medina	Centennial F
3/29/2022	11:00 AM	12:15 PM	WG Guide for Loading Dry Type Transformers C57.96	Dry Type	A. Narawane	Centennial H
3/29/2022	3:15 PM	4:30 PM	WG Dry Type PD Detection PC57.124	Dry Type	T. Prevost	Mineral Hall A
3/29/2022	4:45 PM	6:00 PM	WG Dry Type Test Code C57.12.91	Dry Type	D. Walker	Centennial H
3/30/2022	1:30 PM	2:45 PM	SC Dry Type Transformers	Dry Type	C. Ballard	Centennial F-G
3/28/2022	4:45 PM	6:00 PM	SC HVDC Converter Transfs & Smoothing Reactors	HVDC	U. Radbrandt	Centennial H
3/28/2022	11:00 AM	12:15 PM	WG Guide for DGA in Silicone PC57.146	IF	J. Karas	Mineral Hall A
3/28/2022	4:45 PM	6:00 PM	<del>TF Next Revision to C57.104 Guide for DGA in Mineral Oil</del>	IF	C. Beauchemin	Centennial D-E <b>CANCELLED</b>
3/29/2022	9:30 AM	10:45 AM	TF Guide for the Reclamation of Mineral Oil - C57.637	IF	S. Denzer	Centennial H
3/29/2022	11:00 AM	12:15 PM	WG Guide for DGA Applied to Factory Temp Rise Test C57.130	IF	B. Forsyth	Centennial G
3/29/2022	1:45 PM	3:00 PM	WG Consolidation Insulating Fluid Guides PC57.166	IF	T. Prevost	Centennial F
3/29/2022	3:15 PM	4:30 PM	WG Guide DGA in Ester-Immersed Transformers PC57.155	IF	A. Sbravati	Centennial H
3/29/2022	4:45 PM	6:00 PM	TF Revision of Guide for DGA in LTCs C57.139	IF	R. Frotscher	Mineral Hall B-C
3/30/2022	3:00 PM	4:15 PM	SC Insulating Fluids	IF	S. Reed	Centennial F-G
3/28/2022	9:30 AM	10:45 AM	WG Moisture in Insulation PC57.162	Ins Life	T. Prevost	Centennial D-E
3/28/2022	1:45 PM	3:00 PM	TF Application of High-Temp Insulation Matr 1276 Annex B	Ins Life	K. Biggie	Mineral Hall A
3/29/2022	8:00 AM	9:15 AM	TF Rises other than windings C57.12.00, Clause 5.11.1.4	Ins Life	T. Johnson	Mineral Hall A
3/29/2022	9:30 AM	10:45 AM	WG Temp Measurement PC57.165	Ins Life	M. Tostrud	Mineral Hall B-C
3/29/2022	11:00 AM	12:15 PM	WG Thermal Evaluation C57.100	Ins Life	R. Wicks	Centennial D-E
3/29/2022	1:45 PM	3:00 PM	TF Continuous Rev Clause 11 Temp Rise Tests C57.12.90	Ins Life	D. Sankarapur	Centennial G
3/29/2022	4:45 PM	6:00 PM	WG Loading Guide PC57.91	Ins Life	D. Wallach	Centennial F
3/30/2022	8:00 AM	9:15 AM	SC Insulation Life	Ins Life	S. Sharpless	Centennial E (3)
3/29/2022	8:00 AM	9:15 AM	WG Station Service Volt. Transf. C57.13.8	Instr TR	D. Wallace	Mineral Hall B-C
3/29/2022	9:30 AM	10:45 AM	TF Instrument Transf. Accuracy	Instr TR	I. Ziger	Mineral Hall A
3/29/2022	11:00 AM	12:15 PM	WG Requirements for Instrument Transformers PC57.13	Instr TR	D. Wallace	Mineral Hall A
3/30/2022	8:00 AM	9:15 AM	SC Instrument Transformers	Instr TR	T. Sizemore	Centennial F-G
3/30/2022	7:00 AM	8:00 AM	SC Meetings Planning	Mtgs	T. Behrens	Mineral Hall C (3)

## SUBCOMMITTEE MEETING LIST

## SPRING 2022 MEETING: MARCH 27 TO MARCH 31

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Date	Time Start	Time End	Session Title	Track	Chair	Room/Location
3/28/2022	9:30 AM	10:45 AM	WG Guide of FRA for Liquid Filled Transf. C57.149	PCS	C. Sweetser	Mineral Hall B-C
3/28/2022	1:45 PM	3:00 PM	TF Audible Sound Revs & WG Sound Guide C57.136 (S. Antosz)	PCS	R. Girgis	Centennial D-E
3/28/2022	3:15 PM	4:30 PM	TF PCS Cont. Revisions to C57.12.00	PCS	T. Ansari	Centennial D-E
3/29/2022	9:30 AM	10:45 AM	TF PCS Cont. Rev. to Test Code C57.12.90	PCS	H. Sahin	Centennial D-E
3/29/2022	3:15 PM	4:30 PM	WG Sw Transients Ind by TR/Bkr Interaction PC57.142	PCS	J. McBride	Centennial D-E
3/30/2022	3:00 PM	4:15 PM	SC Performance Characteristics	PCS	R. Verdolin	Centennial E (3)
3/26/2022	8:00 AM	5:00 PM	WG Standard Requirements for Tap Changers - C57.131	Power	C. Colopy	Quartz (3)
3/28/2022	9:30 AM	10:45 AM	WG Standard Requirements for Tap Changers - C57.131	Power	C. Colopy	Centennial G
3/28/2022	11:00 AM	12:15 PM	WG C57.116 Guide for Trfs Direct Connect to Generators	Power	W. Li	Centennial G
3/28/2022	3:15 PM	4:30 PM	WG Transformer Monitoring C57.143	Power	M. Spurlock	Centennial G
3/28/2022	4:45 PM	6:00 PM	WG Failure Investigation & Reporting PC57.125	Power	H. Sahin	Centennial G
3/29/2022	8:00 AM	9:15 AM	WG Condition Assessment Guide PC57.170	Power	K. Mani	Centennial G
3/29/2022	9:30 AM	10:45 AM	WG Transportation Issues C57.150	Power	G. Anderson	Centennial G
3/29/2022	1:45 PM	3:00 PM	WG Volts per Hertz C57.107	Power	J. Watson	Centennial D-E
3/29/2022	3:15 PM	4:30 PM	TF Guide for Install & Maintenance of Power Trf C57.93	Power	S. Reed	Centennial G
3/30/2022	1:30 PM	2:45 PM	SC Power Transformers	Power	R. Musgrove	Centennial E (3)
3/28/2022	9:30 AM	10:45 AM	WG Std Transf. Terminology C57.12.80	Stds	J. Graham	Centennial F
3/28/2022	1:45 PM	3:00 PM	WG PC57.152 Guide for Field Testing	Stds	M. Ferreira	Centennial F
3/29/2022	3:15 PM	4:30 PM	WG Geomagnetic Disturbances PC57.163	Stds	D. Blaydon	Centennial F
3/30/2022	4:30 PM	5:45 PM	SC Standards	Stds	D. Sauer	Centennial F-G (3)
3/28/2022	4:45 PM	6:00 PM	WG Submersible Transf. C57.12.24	STNP	B. Garcia	Centennial F
3/29/2022	11:00 AM	12:15 PM	WG Liquid-immersed Sec. Network TRs C57.12.40	STNP	D. Blew	Mineral Hall B-C
3/29/2022	1:45 PM	3:00 PM	WG Guide for Mitigating Corrosion on Subsurface Trfs	STNP	W. Elliott	Mineral Hall B-C
3/30/2022	11:00 AM	12:15 PM	SC Submersible Transf. & Network Protectors	STNP	G. Payerle	Centennial F-G

## **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: Ed Smith  
Pg 3

Performance Characteristics  
Chair: Rogerio Verdolin  
Pg 6

Dry Type Transformers  
Chair: Casey Ballard  
Pg 3

Power Transformers  
Chair: Ryan Musgrove  
Pg 7

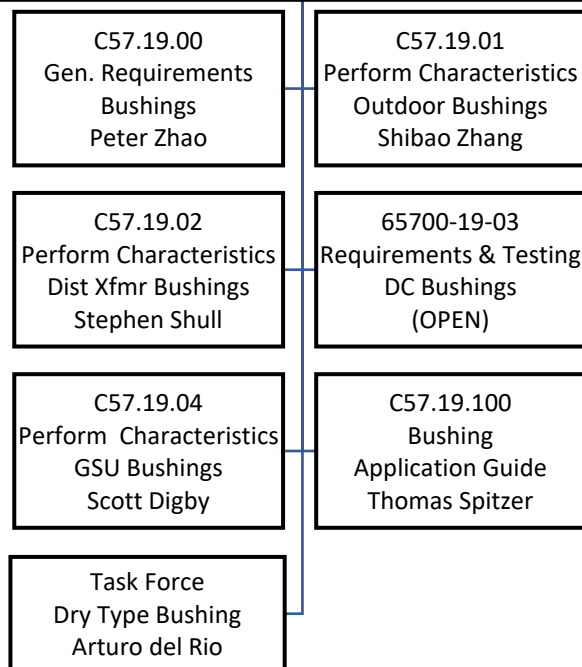
HVDC Converters & Smoothing Reactors  
Chair: Ulf Radbrandt  
Pg 4

Standards  
Chair: Dan Sauer  
Pg 8

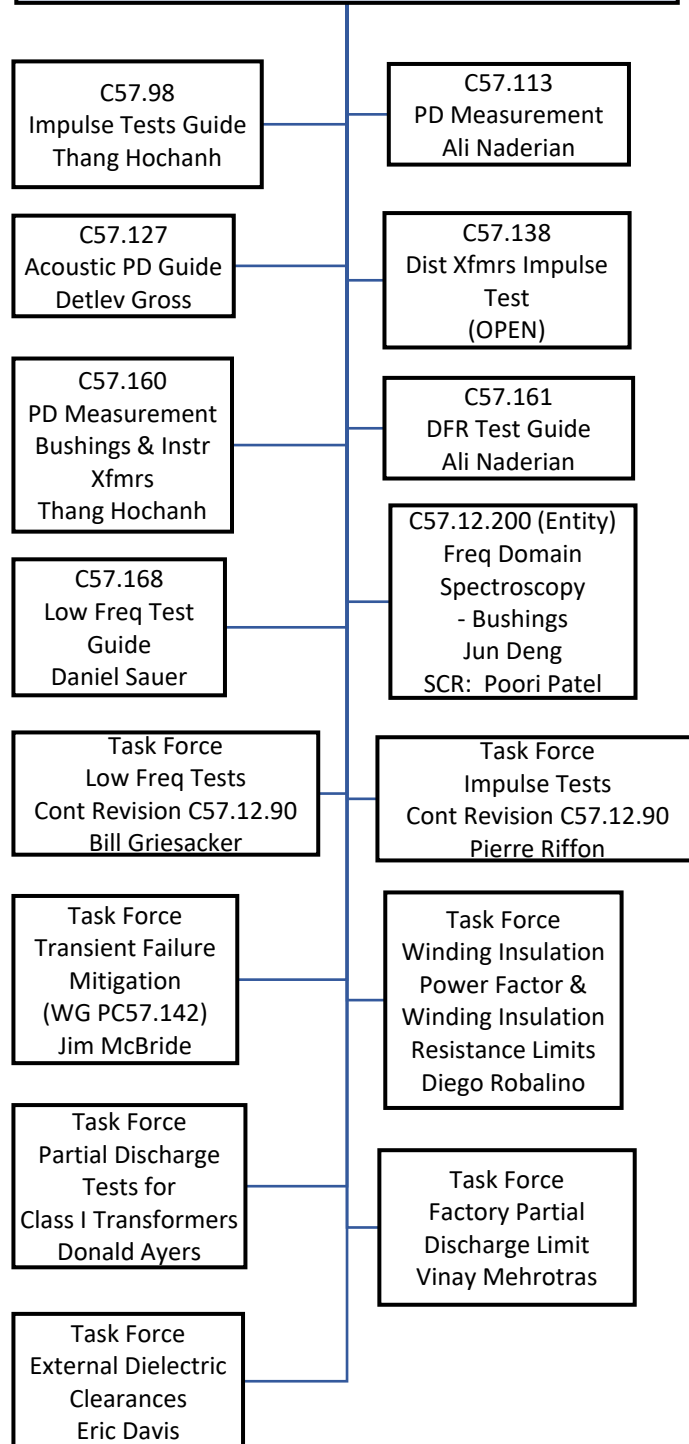
Instrument Transformers  
Chair: Thomas Sizemore  
Pg 4

Subsurface Transformers  
& Network Protectors  
Chair: George Payerle  
Pg 4

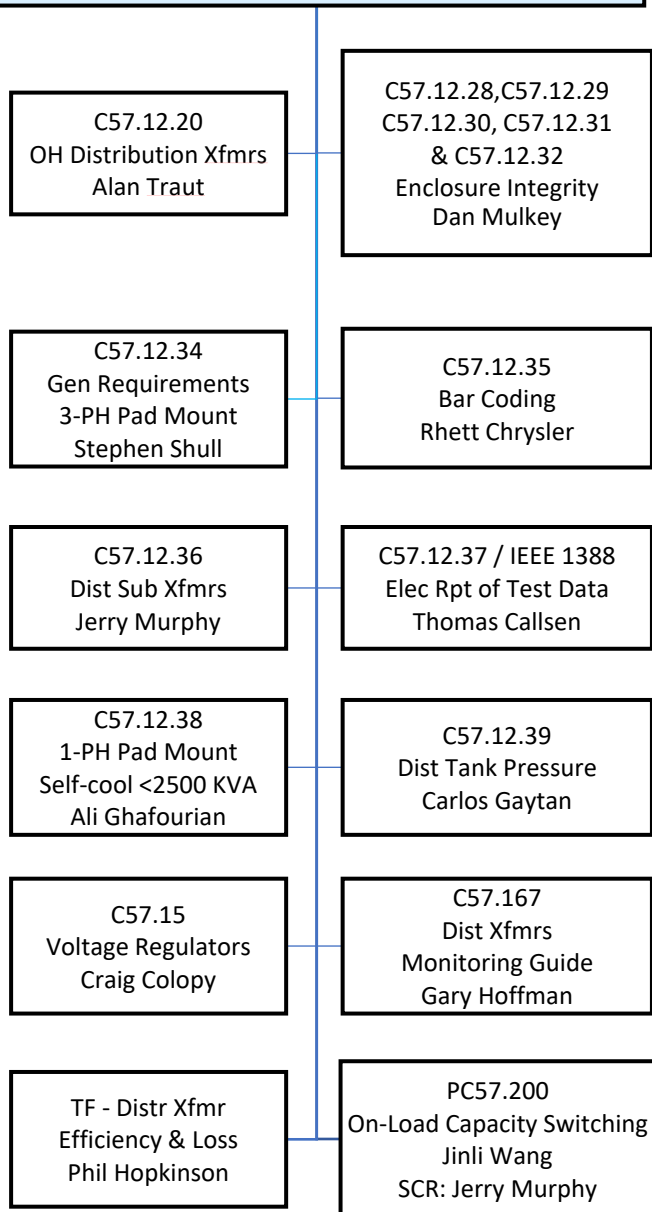
## Bushings Chair - Eric Weatherbee



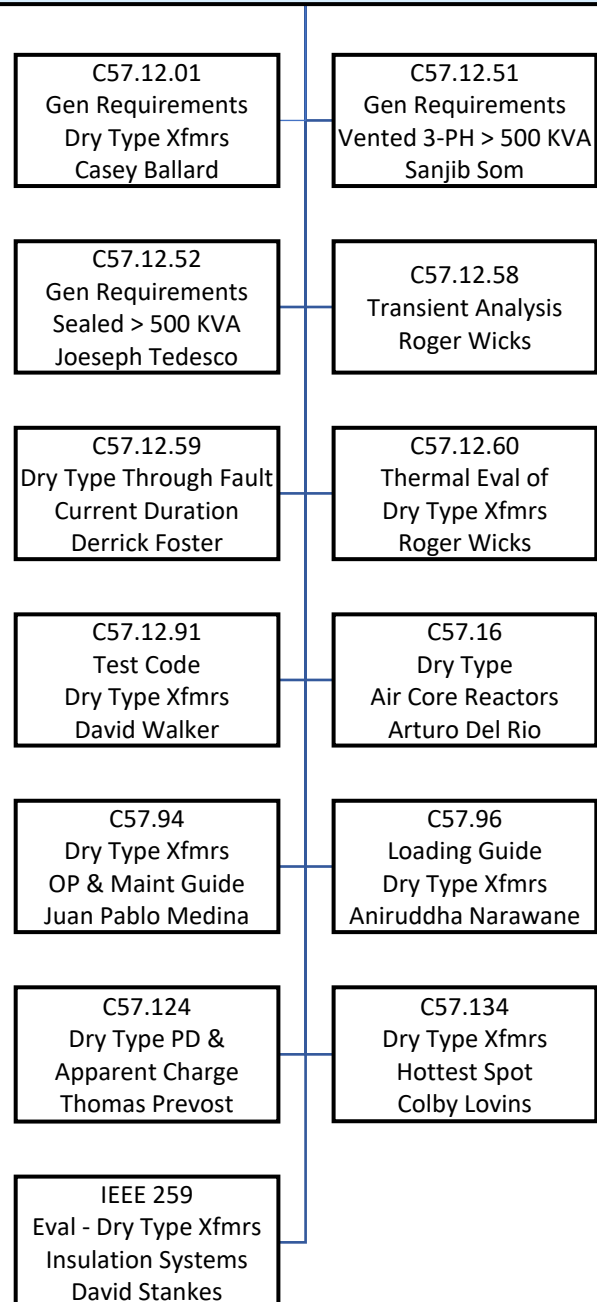
## Dielectric Tests Chair - Dr. Poorvi Patel



## Distribution Transformers Chair - Ed Smith



## Dry Type Transformers Chair - Casey Ballard



## HVDC Converter Transformers & Smoothing Reactors Chair - Ulf Radbrandt

IEEE 1277  
Requirements & Test  
Code for Smoothing  
Reactors  
Klaus Pointner

IEC\_ IEEE 60076-57-12  
Requirements  
& Test Code for HVDC  
Converter Xfmrs  
Ulf Radbrandt

IEEE 638  
IEEE Standard for  
Qualification of Class 1E  
Transformers for Nuclear  
Power Generating  
Stations  
(OPEN)

## Subsurface Transformers & Network Protectors Chair - George Payerle

C57.12.23  
Cont. Revision  
Submersible 1Ø Xfmrs  
Allan Traut

C57.12.24  
Cont Revision  
Submersible 3Ø Xfmrs  
>2500 KVA  
Benjamin Garcia

C57.12.40  
Cont Revision  
Sec Network Xfmrs  
David Blew

C57.12.44  
Cont Revision  
Sec Network  
Protectors  
Mark Faulkner

C57.12.57  
Ventilated Dry-Type  
Network Transformers  
2500 kVA and Below  
(OPEN)

C57.12.53  
Corrosion effects on  
Subsurface Transformers  
Will Elliot

## Instrument Transformers Chair - Thomas Sizemore

C57.13  
Requirements  
Instrument Xfmrs  
(OPEN)

C57.13.2  
Test Procedures  
Instrument Xfmrs  
Thomas Sizemore

C57.13.5  
Test Requirements  
Instr Xfmrs  $\geq 115$  kV  
Pierre Riffon

C57.13.6  
Requirements  
High Accuracy  
Instr Xfmrs  
(OPEN)

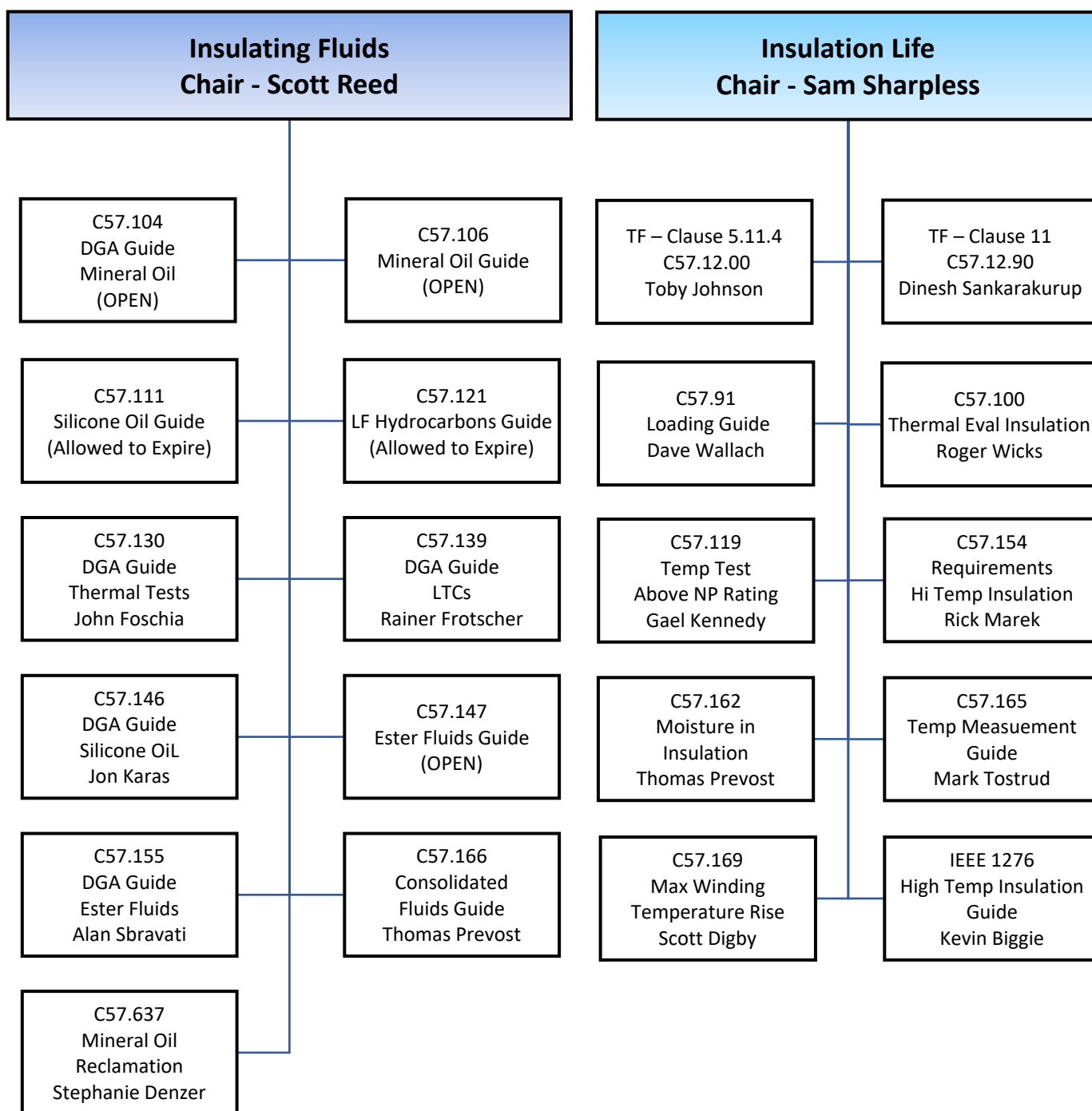
C57.13.7  
Requirements mA CT  
Henry Alton

IEC-IEEE 63245-5713-8  
Requirements SSVTs  
Dave Wallace

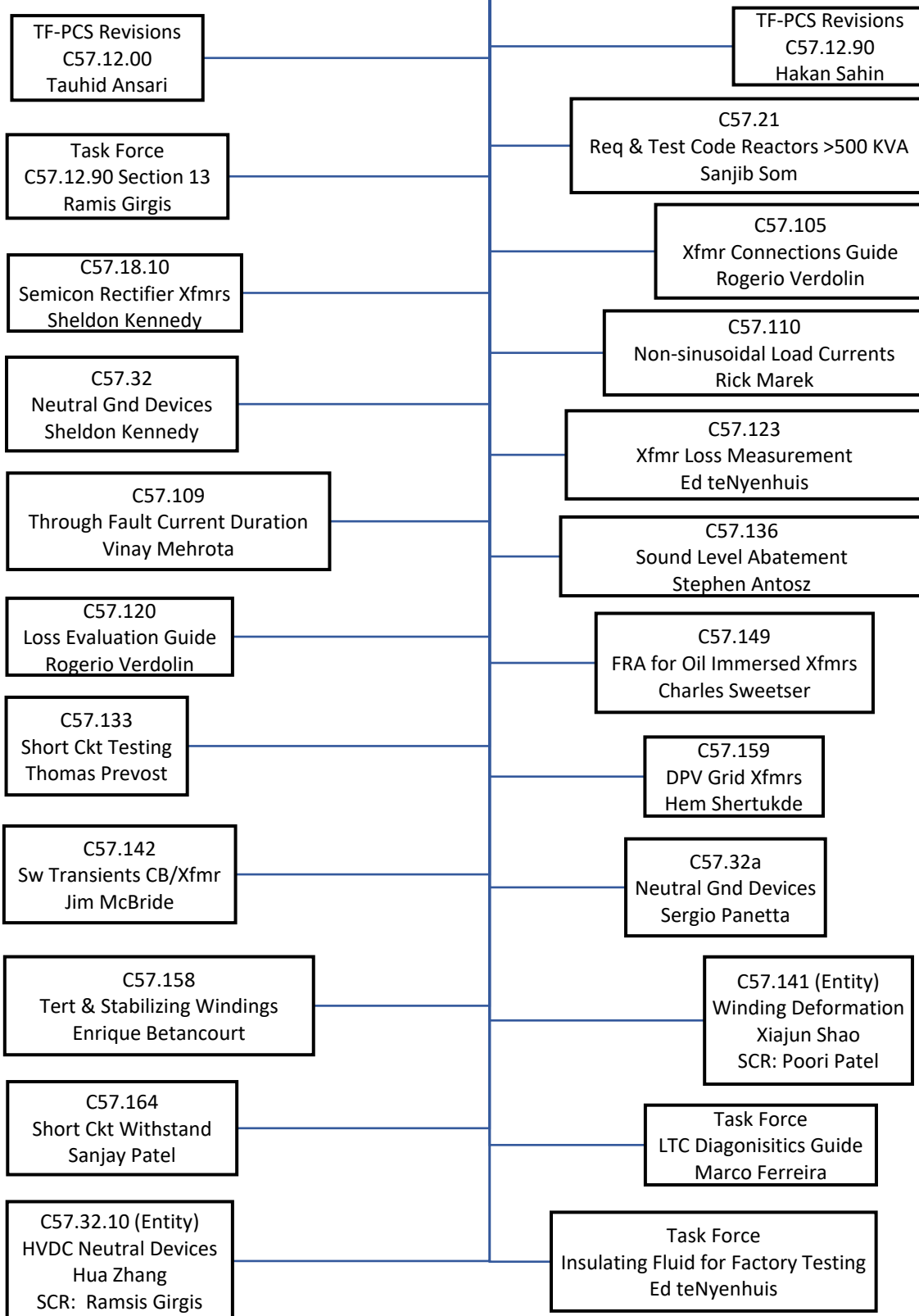
C57.13.9  
Requirements CCVTs  
Zoltan Roman

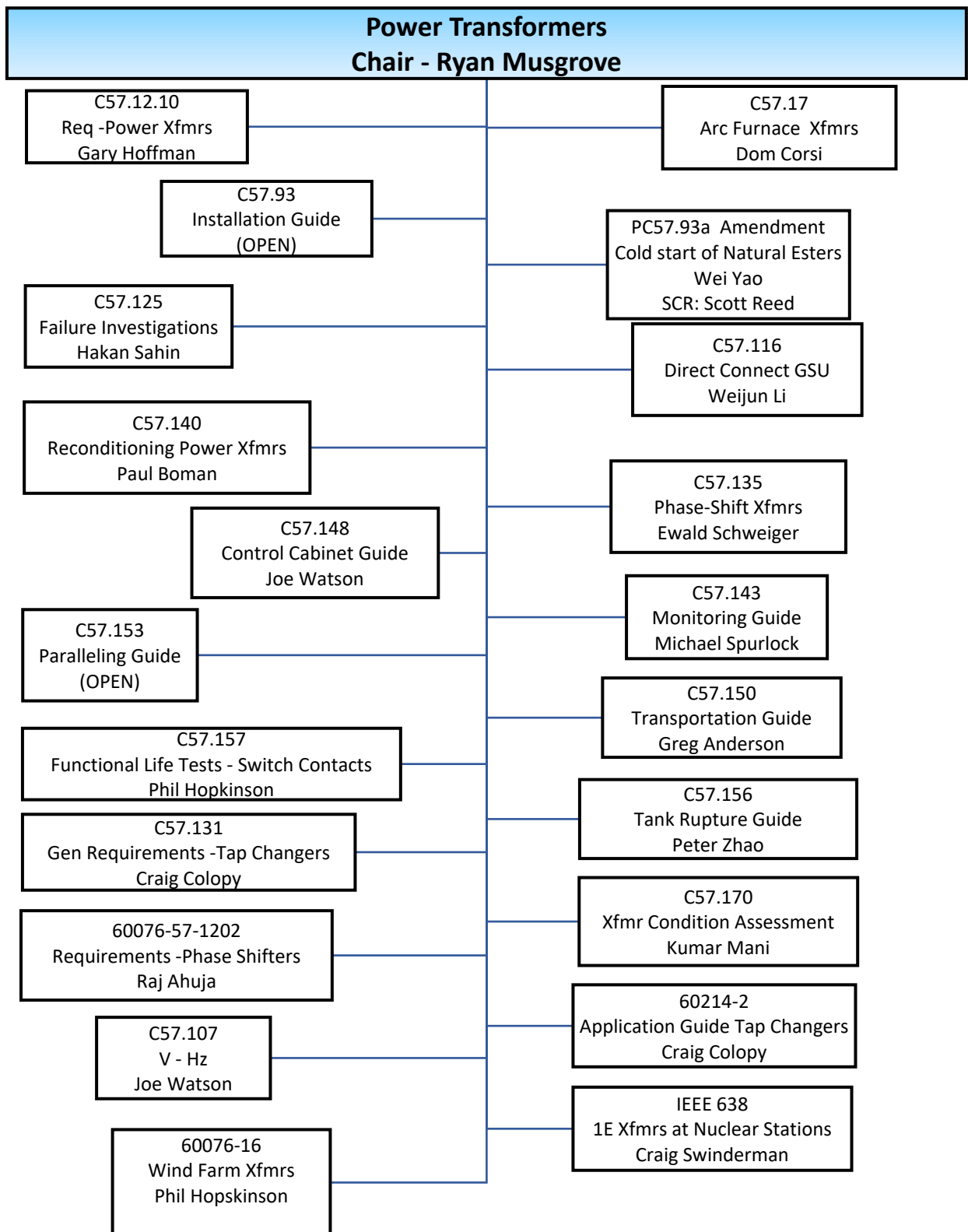
Task Force  
Instrument  
Transformers Accuracy  
Igor Ziger

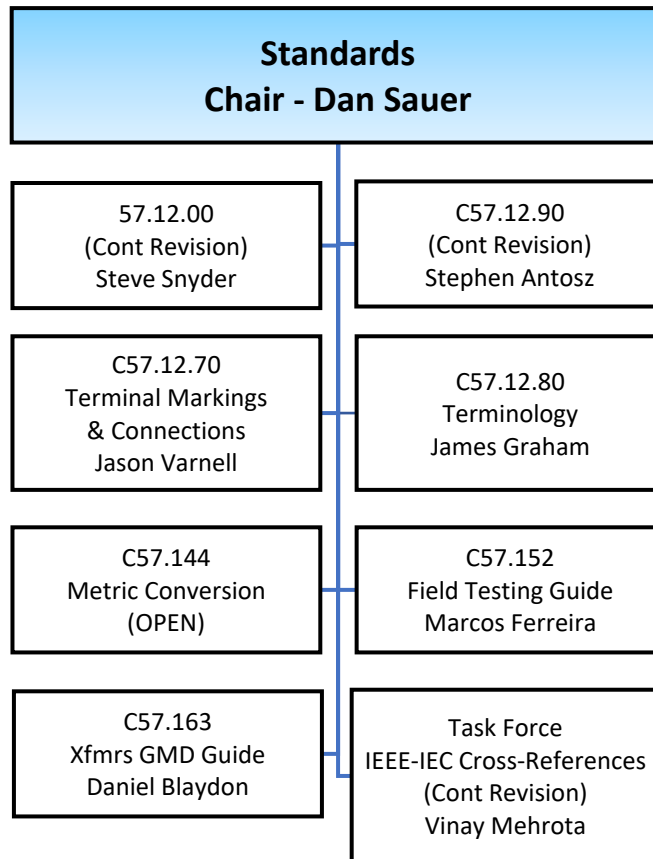




## Performance Characteristics Chair - Rogerio Verdolin







# 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 <b>BUSHINGS</b>					
CHAIR: <b>Eric Weatherbee</b>		eweatherbee@hubbell.com		(585) 768 - 1272	
<b>Individual</b>	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 + 1 PAR Extension In Ballot
<b>PC57.19.02</b>				<b>12/31/2022</b>	
<b>65700-19-03</b>	IEC/IEEE International Standard -- Bushings for DC application	Eric Weatherbee (585) 768 - 1272 eweatherbee@hubbell.com	2014	9/23/2021	ACTIVE + PAR for Revision
<b>Individual</b>				<b>12/31/2024</b>	
<b>P65700-19-03</b>				<b>12/31/2025</b>	
<b>C57.19.00</b>	Standard General Requirements and Test Procedure for Power Apparatus Bushings	Peter Zhao (416) 345 - 5926 peter.zhao@hydroone.com	2004	2/15/2018	INACTIVE-RESERVED + PAR for Revision
<b>Individual</b>				<b>12/31/2020</b>	
<b>PC57.19.00</b>				<b>12/31/2022</b>	
<b>C57.19.01</b>	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings		2017		ACTIVE
<b>Individual</b>				<b>12/31/2027</b>	
<b>C57.19.04</b>	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
<b>Individual</b>				<b>12/31/2028</b>	
<b>C57.19.100</b>	IEEE Guide for Application of Power Apparatus Bushings	Thomas Spitzer (817) 584 - 6567 t.spitzer@sbcglobal.net	2012	5/21/2019	ACTIVE + PAR for Revision
<b>Individual</b>				<b>12/31/2022</b>	
<b>PC57.19.100</b>				<b>12/31/2023</b>	

# 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 <b>DIELECTRIC TESTS</b>					
CHAIR: <b>Ajith Varghese</b>		ajith.varghese@spx.com	(262) 442 - 7197		
<b>Entity</b>	Guide for the Frequency Domain Spectroscopy Measurement of Transformer Bushings	Jinli Wang		9/27/2018	Active PAR
<b>PC57.12.200</b>		..... wangjinli@epri.sgcc.com.cn		<b>12/31/2022</b>	SCR: Poori Patel Ballot invitation to close on 3/31/2022
<b>Individual</b>	Guide for the Electrical Measurement of Partial Discharges in High Voltage Bushings and Instrument Transformers	Thang Hochanh		6/15/2017	Active PAR
<b>PC57.160</b>		(819) 821-3636 thanghochanh@surplec.com		<b>12/31/2022</b>	SA BALLOT closed 1/9/2019 with 520 comments to resolve. Currently in comment resolution.
<b>Individual</b>	Guide for Low Frequency Dielectric Testing for Distribution, Power and Regulating Transformers	Daniel Sauer		6/14/2018	Active PAR
<b>PC57.168</b>		(262) 896 - 2417 dmsauer@mtu.edu		<b>12/31/2022</b>	
<b>C57.113</b>	IEEE Guide for Partial Discharge Measurement in Liquid-Filled Power Transformers and Shunt Reactors	Ali Naderian	2010	12/6/2017	INACTIVE-RESERVED + PAR Revision +1 PAR Extension
<b>Individual</b>		(647) 300 - 8836 ali.naderian@ieee.org	<b>12/31/2020</b>	<b>12/31/2023</b>	
<b>PC57.113</b>					
<b>C57.127</b>	IEEE Guide for the Detection, Location and Interpretation of Sources of Acoustic Emissions from Electrical Discharges in Power Transformers and Power Reactors		2018		ACTIVE
<b>Individual</b>			<b>12/31/2028</b>		
<b>C57.138</b>	IEEE Recommended Practice for Routine Impulse Test for Distribution Transformers		2016		ACTIVE
<b>Individual</b>			<b>12/31/2026</b>		
<b>C57.161</b>	IEEE Guide for Dielectric Frequency Response Test		2018		ACTIVE
<b>Individual</b>			<b>12/31/2028</b>		
<b>C57.98</b>	IEEE Guide for Transformer Impulse Tests	Thang Hochanh	2011	10/27/2018	ACTIVE + PAR for Revision
<b>Individual</b>		(819) 821-3636 thanghochanh@surplec.com	<b>12/31/2021</b>	<b>12/31/2022</b>	
<b>PC57.98</b>					

# 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 <b>DISTRIBUTION TRANSFORMERS</b>					
CHAIR: <b>Edward Smith</b>		edsmith@h-j.com		(636) 677 - 3421	
<b>Entity</b>	Recommended Practice for On-load Capacity Switching Distribution Transformers	Jinli Wang		2/10/2021	Active PAR
<b>PC57.12.210</b>		..... wangjinli@epri.sgcc.com.cn		<b>12/31/2025</b>	SCR: Jerry Murphy
<b>Individual</b>	Guide for Monitoring Distribution Transformers	Gary Hoffman		6/14/2018	Active PAR
<b>PC57.167</b>		(973) 474 - 2171 grhoffman@advpowertech.co		<b>12/31/2022</b>	
<b>C57.12.20</b>	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
<b>Individual</b>		(601) 422 - 1198 atraut@ieee.org	<b>12/31/2027</b>	<b>12/31/2023</b>	
<b>PC57.12.20</b>					
<b>C57.12.28</b>	Standard for Pad Mounted Equipment - Enclosure Integrity	Daniel Mulkey	2014	3/5/2020	ACTIVE + PAR for Revision
<b>Individual</b>		(707) 776 - 7346 dhmulkey@ieee.org	<b>12/31/2024</b>	<b>12/31/2024</b>	
<b>PC57.12.28</b>					
<b>C57.12.29</b>	Standard for Pad Mounted Equipment - Enclosure Integrity for Coastal Environments	Daniel Mulkey	2014	3/5/2020	ACTIVE + PAR for Revision
<b>Individual</b>		(707) 776 - 7346 dhmulkey@ieee.org	<b>12/31/2024</b>	<b>12/31/2024</b>	
<b>PC57.12.29</b>					
<b>C57.12.30</b>	Std for Pole-Mounted Eqpt - Enclosures for Coastal Environment		2020		ACTIVE
<b>Individual</b>			<b>12/31/2030</b>		
<b>C57.12.31</b>	IEEE Standard for Pole Mounted Equipment - Enclosure Integrity		2020		ACTIVE
<b>Individual</b>			<b>12/31/2030</b>		
<b>C57.12.32</b>	Standard for Submersible Equipment - Enclosure Integrity		2019		ACTIVE
<b>Individual</b>			<b>12/31/2029</b>		

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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 <b>DISTRIBUTION TRANSFORMERS</b>					
CHAIR: <b>Edward Smith</b>		edsmith@h-j.com		(636) 677 - 3421	
<b>C57.12.34</b>	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 (417) 206 - 4047 sshull@ckt.net	2015 <b>12/31/2025</b>	9/22/2016 <b>12/31/2022</b>	ACTIVE + PAR for Revision + 1 PAR extension Currently in Ballot - Close 3/24/2022
<b>Individual</b>					
<b>PC57.12.34</b>					
<b>C57.12.35</b>	IEEE Standard Bar Coding for Distribution Transformers and Step-Voltage Regulators	Rhett Chrysler (731) 288 - 2831 rhettchrysler@ieee.org	2013 <b>12/31/2023</b>	6/13/2019 <b>12/31/2023</b>	ACTIVE + PAR for Revision
<b>Individual</b>					
<b>PC57.12.35</b>					
<b>C57.12.36</b>	Standard Requirements for Liquid-Immersed Distribution Substation Transformers		2017 <b>12/31/2027</b>		ACTIVE
<b>Individual</b>					
<b>C57.12.37</b>	IEEE Standard for the Electronic Reporting of Transformer Test Data		2015 <b>12/31/2025</b>		ACTIVE
<b>Individual</b>					
<b>C57.12.38</b>	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 (706) 202 - 7212 asghar.ghafourian@gmail.com	2014 <b>12/31/2024</b>	10/28/2017 <b>12/31/2023</b>	ACTIVE + PAR for Revision + 1 PAR Extension Corrigenda PAR is currently active until 2024. Corrigenda PAR will be allowed to expire.
<b>Individual</b>					
<b>PC57.12.38</b>					
<b>C57.12.39</b>	IEEE Standard for Requirements for Distribution Transformer Tank Pressure Coordination		2017 <b>12/31/2027</b>		ACTIVE
<b>Individual</b>					
<b>C57.15</b>	IEEE Standard Requirements, Terminology, and Test Code for Step-Voltage Regulators		2017 <b>12/31/2027</b>		ACTIVE
<b>Individual</b>					



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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 <b>DRY TYPE TRANSFORMERS</b>					
CHAIR:	Casey Ballard	robert.c.ballard@ieee.org		(804) 292 - 5207	
<b>259</b>	IEEE Standard Test Procedure for Evaluation of Systems of Insulation for Dry-Type Specialty and General-Purpose Transformers	Juan-Pablo Andrade Medina	1999	12/3/2020	INACTIVE-RESERVED+ PAR for Revision
<b>Individual</b>		(815) 678-2421	<b>12/31/2020</b>		Standard was allowed to expire by the SC. However, when revising IEEE C57.12.60, the need for this standard was recognized.
<b>P259</b>		jmedina@olsun.com		<b>12/31/2024</b>	
<b>C57.12.01</b>	IEEE Standard for General Requirements for Dry-Type Distribution and Power Transformers	Casey Ballard	2020	2/23/2022	ACTIVE + PAR for Revision
<b>Individual</b>		(804) 292 - 5207	<b>12/31/2030</b>		This standard is under continuous revision.
<b>PC57.12.01</b>		robert.c.ballard@ieee.org		<b>12/31/2026</b>	
<b>C57.12.51</b>	IEEE Guide for Mechanical Interchangeability of Ventilated Dry-Type Transformers		2019		ACTIVE
<b>Individual</b>			<b>12/31/2029</b>		
<b>C57.12.52</b>	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	2012	3/5/2020	ACTIVE + PAR for Revision
<b>Individual</b>		(276) 688-1675	<b>12/31/2022</b>		Scope Changed and Approved 2/23/2022
<b>PC57.12.52</b>		joseph.l.tedesco@hitachi-powe		<b>12/31/2024</b>	
<b>C57.12.58</b>	IEEE Guide for Conducting a Transient Voltage Analysis of a Dry-Type Transformer Coil		2017		ACTIVE
<b>Individual</b>			<b>12/31/2027</b>		
<b>C57.12.59</b>	IEEE Guide for Dry-Type Transformer Through-Fault Current Duration		2015		ACTIVE
<b>Individual</b>			<b>12/31/2025</b>		Dereck Foster has been appointed to TF Chair to study the need for revision.
<b>C57.12.60</b>	IEEE Standard for Thermal Evaluation of Insulation Systems for Dry-Type Power and Distribution Transformers		2020		ACTIVE
<b>Individual</b>			<b>12/31/2030</b>		
<b>C57.12.91</b>	IEEE Standard Test Code for Dry-Type Distribution and Power Transformers	David Walker	2020	2/23/2022	ACTIVE + PAR for Revision
<b>Individual</b>		(520) 484 - 5338	<b>12/31/2030</b>		This standard is under continuous revision.
<b>PC57.12.91</b>		djwalker1260@gmail.com		<b>12/31/2026</b>	

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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 <b>DRY TYPE TRANSFORMERS</b>					
CHAIR:	Casey Ballard	robert.c.ballard@ieee.org		(804) 292 - 5207	
<b>C57.124</b>	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 <b>12/31/2019</b>	6/15/2017 <b>12/31/2023</b>	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.
<b>Individual</b>					
<b>PC57.124</b>					
<b>C57.134</b>	IEEE Guide for Determination of Hottest Spot Temperature in Dry Type Transformers	Colby Lovins colby.lovins@ieee.org	2013 <b>12/31/2023</b>	5/21/2021 <b>12/31/2025</b>	ACTIVE + PAR for Revision
<b>Individual</b>					
<b>PC57.134</b>					
<b>C57.16</b>	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 <b>12/31/2021</b>	2/5/2016 <b>12/31/2022</b>	ACTIVE + PAR for Revision + 1 PAR Extension
<b>Individual</b>					
<b>PC57.16</b>					
<b>C57.94</b>	IEEE Recommended Practice for Installation, Application, Operation, and Maintenance of Dry-Type Distribution and Power Transformers	Juan-Pablo Andrade Medina (815) 678-2421 jmedina@olsun.com	2015 <b>12/31/2025</b>	2/23/2022 <b>12/31/2026</b>	ACTIVE + PAR for Revision
<b>Individual</b>					
<b>PC57.94</b>					
<b>C57.96</b>	IEEE Guide for Loading Dry-Type Distribution and Power Transformers	Aniruddha Narawane (804) 229 - 5956 aniraj200@yahoo.com	2013 <b>12/31/2023</b>	2/10/2021 <b>12/31/2025</b>	ACTIVE + PAR for Revision
<b>Individual</b>					
<b>PC57.96</b>					

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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 <b>HVDC TRANSFORMERS</b>				
<b>CHAIR:</b>	<b>Ulf Radbrandt</b>	ulf.radbrandt@ieee.org	4 (624) 078 - 3357	
<b>1277</b>	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
<b>Individual</b>		<b>12/31/2030</b>		
<b>60076-57-129</b>	IEC/IEEE International Standard - Power transformers--Part 57-129: Transformers for HVDC applications	2017		ACTIVE
<b>Individual</b>		<b>12/31/2027</b>		

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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 <b>INSTRUMENT TRANSFORMERS</b>					
CHAIR: <b>Thomas Sizemore</b>		thomas.sizemore.us@ieee.org	(252) 827 - 3235		
<b>Individual</b> P63253-5713-8	Standard Requirements for Station Service Voltage Transformers	David Wallace (662) 325 - 2009 daweleceng@aol.com	12/31/2021	12/11/2013 12/31/2023	Active PAR The original PAR was approved on 12/11/2013. The original Project was called PC57.13.8. It was extended on 6/15/2017, modified to a dual logo on 3/21/2019.
<b>Individual</b> 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
<b>C57.13</b> <b>Individual</b> 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
<b>C57.13.2</b> <b>Individual</b> PC13.2	Conformance Test Procedure for Instrument Transformers	Shibao Zhang (585) 768-1273 szhang@hubbell.com	2005 12/31/2020	12/6/2017 12/31/2023	INACTIVE-RESERVED+PAR for Revision+1 PAR extension Ballot closed on 11/13/2021. Currently in comment resolution.
<b>C57.13.5</b> <b>Individual</b>	Standard of Performance and Test Requirements for Instrument Transformers of a Nominal System Voltage of 115 kV and Above		2019 12/31/2029		ACTIVE
<b>C57.13.6</b> <b>Individual</b>	Standard for High Accuracy Instrument Transformers		2005 12/31/2020		INACTIVE-RESERVED
<b>C57.13.7</b> <b>Individual</b>	IEEE Standard for Current Transformers with Maximum Milliampere Secondary Current of 250 mA		2018 12/31/2028		ACTIVE

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BALLOT TYPE		Phone	Rev Due Date	PAR Expiration	Remark
PROJECT		Email			
SubCommittee <b>INSULATING FLUIDS</b>					
CHAIR:	Scott Reed	sreed@mvadiagnostics.com		(330) 498 - 6259	
<b>Individual</b>	Guide for Acceptance and Maintenance of Insulating Liquids in Transformers and Related Equipment	Thomas Prevost (802) 751 - 3458 tprevost@ieee.org		3/8/2018	Active PAR + PAR for Revision
<b>PC57.166</b>				<b>12/31/2022</b>	
<b>C57.104</b>	IEEE Guide for the Interpretation of Gases Generated in Mineral Oil-Immersed Transformers		2019		ACTIVE
<b>Individual</b>			<b>12/31/2029</b>		
<b>C57.106</b>	IEEE Guide for Acceptance and Maintenance of Mineral Insulating Oil in Electrical Equipment		2015		ACTIVE
<b>Individual</b>			<b>12/31/2025</b>		
<b>C57.111</b>	IEEE Guide for Acceptance of Silicone Insulating Fluid and Its Maintenance in Transformers		1989		INACTIVE-RESERVED
<b>Individual</b>			<b>3/19/2019</b>		
<b>C57.121</b>	IEEE Guide for Acceptance and Maintenance of Less-Flammable Hydrocarbon Fluid in Transformers		1998		INACTIVE-RESERVED
<b>Individual</b>			<b>12/9/2019</b>		
<b>C57.130</b>	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		2015		ACTIVE
<b>Individual</b>			<b>12/31/2025</b>		
<b>C57.139</b>	Guide for Dissolved Gas Analysis in Transformer Load Tap Changers		2015		ACTIVE
<b>Individual</b>			<b>12/31/2025</b>		
<b>C57.146</b>	Guide for Interpretation of Gasses Generated in Silicone-Immersed Transformers	Jon Karas (216) 213-0987 jon.karas@sdmyers.com	2005	3/5/2020	ACTIVE + PAR for Revision
<b>Individual</b>			<b>12/31/2021</b>		
<b>PC57.146</b>				<b>12/31/2024</b>	
<b>C57.147</b>	Guide for Acceptance and Maintenance of Natural Insulating Liquid in Transformers		2018		ACTIVE
<b>Individual</b>			<b>12/31/2028</b>		

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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 <b>INSULATING FLUIDS</b>					
CHAIR:	Scott Reed	sreed@mvadiagnostics.com		(330) 498 - 6259	
<b>C57.155</b>	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
<b>Individual</b>		(612) 413 - 4599	<b>12/31/2024</b>		
<b>PC57.155</b>		alan_sbravati@cargill.com		<b>12/31/2025</b>	
<b>C57.637</b>	IEEE Guide for the Reclamation of Mineral Insulating Oil and Criteria for Its Use	Stephanie Denzer	2015	9/23/2021	ACTIVE + PAR for Revision
<b>Individual</b>		(330) 581 - 4103	<b>12/31/2025</b>		
<b>PC57.637</b>		stephaniedenzer@alliantenerg		<b>12/31/2025</b>	

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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 <b>INSULATION LIFE</b>					
CHAIR: <b>Samuel Sharpless</b>		ssharpless@rimkus.com	(407) 661 - 1245		
<b>Individual</b> <b>PC57.162</b>	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  <b>12/31/2022</b>	Active PAR + 2 PAR Extensions  This will not get another extension without significant extenuating circumstances.
<b>Individual</b> <b>PC57.165</b>	Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors	Mark Tostrud (262) 746 - 1230 mark.tostrud@dynamicratings.		2/17/2017  <b>12/31/2023</b>	Active PAR + 1 PAR Extension
<b>Individual</b> <b>PC57.169</b>	Guide for Determination of Maximum Winding Temperature Rise in Liquid-Immersed Transformers	Scott Digby (919) 546 - 5798 scott.digby@duke-energy.com		3/21/2019  <b>12/31/2023</b>	Active PAR
<b>1276</b> <b>Individual</b> <b>P1276a</b>	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 <b>12/31/2030</b>	3/23/2022  <b>12/31/2026</b>	ACTIVE + PAR for Amendment
<b>1538</b> <b>Individual</b>	IEEE Guide for Determination of Maximum Winding Temperature Rise in Liquid Filled Transformer		2000 <b>12/31/2021</b>		ACTIVE  Please note that this document will be allowed to go inactive as it is being replaced by C57.169.
<b>1538a</b> <b>Individual</b>	IEEE Guide for Determination of Maximum Winding-Temperature Rise in Liquid Immersed Transformers -- Amendment 1		2015 <b>12/31/2021</b>		ACTIVE  Please note that this document will be allowed to go inactive as it is being replaced by C57.169.
<b>C57.100</b> <b>Individual</b> <b>PC57.100</b>	IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution and Power Transformers	Roger Wicks (804) 383 - 3300 roger.c.wicks@dupont.com	2011 <b>12/31/2021</b>	10/30/2018  <b>12/31/2022</b>	ACTIVE + PAR for Revision
<b>C57.119</b> <b>Individual</b>	IEEE Recommended Practice for Performing Temperature Rise Tests on Liquid Immersed Power Transformers at Loads Beyond Nameplate Ratings		2018 <b>12/31/2028</b>		ACTIVE
<b>C57.154</b> <b>Individual</b> <b>PC57.154</b>	IEEE Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid--Immersed Transformers	Richard Marek (804) 768 - 0748 rick.marek@gmail.com	2012 <b>12/31/2022</b>	9/27/2018  <b>12/31/2022</b>	ACTIVE + PAR for Revision  Ballot closed on 11/18/2021. Currently in Comment Resolution

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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 <b>INSULATION LIFE</b>					
CHAIR: <b>Samuel Sharpless</b>		slsharpless@rimkus.com		(407) 661 - 1245	
<b>C57.91</b>	IEEE Guide for Loading Mineral-Oil-Immersed Transformers and Step-Voltage Regulators	David Wallach	2011	9/28/2017	ACTIVE + PAR for Revision
<b>Individual</b>		(980) 373 - 4167	<b>12/31/2021</b>		
<b>PC57.91</b>		david.wallach@duke-energy.c		<b>12/31/2023</b>	



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STANDARD		Working Group Chair	Approved Year	PAR Issue Date	Standard Status
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PROJECT		Email			
SubCommittee <b>PERFORMANCE CHARACTERISTICS</b>					
CHAIR: <b>Rogério Verdolin</b>		roger.verdolin@ieee.org	(403) 850 - 4304		
<b>Entity</b>	Guide for the Selection of Neutral-Grounding Devices for High Voltage Direct Current (HVDC) Converter Transformers	Zhang Hua		10/30/2018	Active PAR
<b>C57.32.10</b>		zhanghua002@163.com		<b>12/31/2022</b>	SCR: Ramsis Girgis
<b>Entity</b>	Guide for Detection, Monitoring, and Evaluation of Winding Deformation in Liquid-Immersed Power Transformers	Xianjun Shao		9/23/2021	Active PAR
<b>PC57.141</b>		shaioxianjun0575@163.com		<b>12/31/2025</b>	SCR: Poori Patel
<b>C57.105</b>	IEEE Guide for Application of Transformer Connections in Three-Phase Distribution Systems	Rogério Verdolin	2019	12/3/2020	ACTIVE + PAR for Corrigenda
<b>Individual</b>		(403) 850 - 4304	<b>12/31/2029</b>		
<b>PC57.105/Cor 1</b>		roger.verdolin@ieee.org		<b>12/31/2024</b>	
<b>C57.109</b>	IEEE Guide for Liquid-Immersed Transformers Through-Fault-Current Duration		2018		ACTIVE
<b>Individual</b>			<b>12/31/2028</b>		
<b>C57.110</b>	IEEE Recommended Practice for Establishing Liquid Immersed and Dry-Type Power and Distribution Transformer Capability when Supplying Nonsinusoidal Load Currents		2018		ACTIVE
<b>Individual</b>			<b>12/31/2028</b>		
<b>C57.120</b>	IEEE Guide for Loss Evaluation of Distribution and Power Transformers and Reactors		2017		ACTIVE
<b>Individual</b>			<b>12/31/2027</b>		
<b>C57.123</b>	IEEE Guide for Transformer Loss Measurement		2019		ACTIVE
<b>Individual</b>			<b>12/31/2029</b>		
<b>C57.136</b>	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
<b>Individual</b>		(412) 498 - 3916	<b>12/31/2018</b>		
<b>PC57.136</b>		santosoz@ieee.org		<b>12/31/2025</b>	
<b>C57.142</b>	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
<b>Individual</b>		(770) 460-6626	<b>12/31/2020</b>		Ballot Invitation Complete - No Ballot yet initiated
<b>PC57.142</b>		jim@jmxhv.com		<b>12/31/2023</b>	

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## 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 <b>PERFORMANCE CHARACTERISTICS</b>					
CHAIR: <b>Rogério Verdolin</b>		roger.verdolin@ieee.org	(403) 850 - 4304		
<b>C57.149</b>	Guide for the Application and Interpretation of Frequency Response Analysis for Oil Immersed Transformers	Charles Sweetser (617) 901 - 6180 charles.sweetser@omiconene	2012 <b>12/31/2022</b>	6/14/2018 <b>12/31/2022</b>	ACTIVE + PAR for Revision
<b>Individual</b>					
<b>PC57.149</b>					
<b>C57.158</b>	IEEE Guide for the Application of Tertiary and Stabilizing Windings in Power Transformers		2017 <b>12/31/2027</b>		ACTIVE
<b>Individual</b>					
<b>C57.159</b>	IEEE Guide on Transformers for Application in Distributed Photovoltaic (DPV) Power Generation Systems		2016 <b>12/31/2026</b>		ACTIVE
<b>Individual</b>					
<b>C57.164</b>	Guide for Establishing Short Circuit Withstand Capabilities of Liquid Immersed Power Transformers, Regulators, and Reactors		2021 <b>12/31/2031</b>		Active
<b>Individual</b>					
<b>C57.18.10</b>	IEEE Standard Practices and Requirements for Semiconductor Power Rectifier Transformers		2021 <b>12/31/2031</b>		ACTIVE
<b>Individual</b>					
<b>C57.21</b>	IEEE Standard Requirements, Terminology, and Test Code for Shunt Reactors Rated Over 500 kVA		2021 <b>12/31/2031</b>		ACTIVE
<b>Individual</b>					
<b>C57.32</b>	IEEE Standard Requirements, Terminology, and Testing Procedures for Neutral Grounding Devices		2015 <b>12/31/2025</b>		ACTIVE
<b>Individual</b>					
<b>C57.32a</b>	IEEE Standard for Requirements, Terminology, and Test Procedure for Neutral Grounding Devices--Amendment 1: Neutral Grounding Resistors Clause (AM)		2020 <b>12/31/2025</b>		ACTIVE
<b>Individual</b>					

# 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 <b>POWER TRANSFORMERS</b>					
CHAIR: <b>Ryan Musgrove</b>		ryan.musgrove@ieee.org	(405) 747 - 7960		
<b>Individual</b> <b>PC57.107</b>	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
				<b>12/31/2025</b>	
<b>Individual</b> <b>PC57.170</b>	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
				<b>12/31/2023</b>	
<b>Entity</b> <b>PC57.93a</b>	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 SCR: Scott Reed
				<b>12/31/2024</b>	
<b>60076-16</b> <b>Individual</b>	IEC/IEEE International Standard - Power transformers - Part 16: Transformers for wind turbine applications		2018		ACTIVE
			<b>12/31/2028</b>		
<b>60076-57-1202</b> <b>Individual</b>	IEC/IEEE International Standard Power transformers --Part 57-1202: Liquid immersed phase-shifting transformers		2016		ACTIVE
			<b>12/31/2026</b>		
<b>60214-2</b> <b>Individual</b>	IEEE Draft Standard for Tap-Changers - Part 2: Application Guide		2019		ACTIVE
			<b>12/31/2029</b>		
<b>638</b> <b>Individual</b>	IEEE Standard for Qualification of Class 1E Transformers for Nuclear Power Generating Stations		2013		ACTIVE
			<b>12/31/2023</b>		
<b>C57.116</b> <b>Individual</b> <b>PC57.116</b>	IEEE Guide for Transformers Directly Connected to Generators	Weijun Li (781) 348 - 1076 wli@beld.com	2014	11/7/2019	ACTIVE + PAR for Revision
			<b>12/31/2024</b>	<b>12/31/2023</b>	

# 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 <b>POWER TRANSFORMERS</b>					
CHAIR: <b>Ryan Musgrove</b>		ryan.musgrove@ieee.org	(405) 747 - 7960		
<b>C57.117</b>	IEEE Guide for Reporting Failure Data for Power Transformers and Shunt Reactors on Electric Utility Power Systems		1987		INACTIVE-RESERVED
<b>Individual</b>			<b>12/31/2018</b>		
<b>C57.12.10</b>	Standard Requirements for Liquid-Immersed Power Transformers		2017		ACTIVE
<b>Individual</b>			<b>12/31/2027</b>		
<b>C57.125</b>	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
<b>Individual</b>			<b>12/31/2025</b>		
<b>PC57.125</b>				<b>12/31/2025</b>	
<b>C57.131</b>	IEEE Standard Requirements for Tap Changers	Craig Colopy (262) 896 - 2342 craigacolopy@eaton.com	2012	12/3/2020	ACTIVE + PAR for Revision
<b>Individual</b>			<b>12/31/2022</b>		
<b>PC57.131</b>				<b>12/31/2024</b>	
<b>C57.135</b>	IEEE Guide for the Application, Specification and Testing of Phase- Shifting Transformers		2011		ACTIVE
<b>Individual</b>			<b>12/31/2021</b>		
<b>C57.140</b>	IEEE Guide for Evaluation and Reconditioning of Liquid Immersed Power Transformers		2017		ACTIVE
<b>Individual</b>			<b>12/31/2027</b>		
<b>C57.143</b>	Guide for Application for Monitoring Equipment to Liquid-Immersed Transformers and Components	Mike Spurlock (614) 933 - 2284 mspurlock@ieee.org	2012	2/17/2017	ACTIVE + PAR for Revision
<b>Individual</b>			<b>12/31/2022</b>		
<b>PC57.143</b>				<b>12/31/2023</b>	
<b>C57.148</b>	Standard for Control Cabinets for Power Transformers		2020		ACTIVE
<b>Individual</b>			<b>12/31/2030</b>		
<b>C57.150</b>	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	ACTIVE + PAR for Revision + !PAR Extension
<b>Individual</b>			<b>12/31/2022</b>		
<b>PC57.150</b>				<b>12/31/2023</b>	

# 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 <b>POWER TRANSFORMERS</b>				
CHAIR: <b>Ryan Musgrove</b>	ryan.musgrove@ieee.org	(405) 747 - 7960		
<b>C57.153</b> <b>Individual</b>	Guide for Paralleling Power Transformers	2015 <b>12/31/2025</b>	ACTIVE	
<b>C57.156</b> <b>Individual</b>	IEEE Guide for Tank Rupture Mitigation of Liquid-Immersed Power Transformers and Reactors	2016 <b>12/31/2026</b>	ACTIVE	
<b>C57.157</b> <b>Individual</b>	IEEE Guide for Conducting Functional Life Tests on Switch Contacts Used in Insulating Liquid--Immersed Transformers	2015 <b>12/31/2025</b>	ACTIVE	
<b>C57.17</b> <b>Individual</b>	Standard Requirements for Arc Furnace Transformers	2012 <b>12/31/2022</b>	ACTIVE	
<b>C57.93</b> <b>Individual</b>	IEEE Approved Draft Guide for Installation and Maintenance of Liquid-Immersed Power Transformers	2019 <b>12/31/2029</b>	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 <b>STANDARDS</b>					
CHAIR: <b>Daniel Sauer</b>		dmsauer@mtu.edu		(262) 896 - 2417	
<b>C57.12.00</b>	IEEE Standard for General Requirements For Liquid-Immersed Distribution, Power, and Regulating Transformers		2021		ACTIVE
<b>Individual</b>			<b>12/31/2031</b>		This standard is under continuous revision.
<b>C57.12.70</b>	IEEE Standard For Standard Terminal Markings and Connections for Distribution and Power Transformers		2020		ACTIVE
<b>Individual</b>			<b>12/31/2030</b>		
<b>C57.12.80</b>	IEEE Standard Terminology for Power and Distribution Transformers	James Graham	2010	3/23/2017	INACTIVE-RESERVED+PAR for Revision+1 PAR Extension
<b>Individual</b>		(412) 478 - 4450	<b>12/31/2020</b>		
<b>PC57.12.80</b>		jimgraham@ieee.org		<b>12/31/2023</b>	
<b>C57.12.90</b>	IEEE Standard Test Code for Liquid-Immersed Distribution, Power, and Regulating Transformers		2021		ACTIVE
<b>Individual</b>			<b>12/31/2031</b>		This standard is under continuous revision
<b>C57.144</b>	Guide for Metric Conversion of Transformer Standards		2004		INACTIVE-RESERVED
<b>Individual</b>			<b>12/31/2020</b>		This was to be incorporated into P947 but this project has been withdrawn. This needs to be reviewed in light of SCC 14 documents.
<b>C57.152</b>	IEEE Guide for Diagnostic Field Testing of Fluid-Filled Power Transformers, Regulators, and Reactors	Marcos Ferreira	2013	6/13/2019	ACTIVE + PAR for Revision
<b>Individual</b>		(971) 703 - 0777	<b>12/31/2023</b>		
<b>PC57.152</b>		mdferreira@comcast.net		<b>12/31/2023</b>	
<b>C57.163</b>	IEEE Guide for Establishing Power Transformer Capability while under Geomagnetic Disturbances	Daniel Blaydon	2015	3/5/2020	ACTIVE + PAR for Revision
<b>Individual</b>		(410) 470 - 8827	<b>12/31/2025</b>		Corrigenda 1 will be included with this Revision. C57.163-2015-Corrigenda 1 will be allowed to expire.
<b>PC57.163</b>		dblaidon@ieee.org		<b>12/31/2024</b>	

# 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 <b>SUBSURFACE TRANSFORMERS &amp; NETWORK PROTECTORS</b>					
CHAIR: <b>George Payerle</b>		gpayerle@roadrunner.com		(330) 908 - 0418	
<b>Individual</b>	IEEE Guide for Mitigating Corrosion on Subsurface Transformers and Network Protectors	William Elliot (318) 286-2868 will.elliott@alumni.lsu.edu		2/23/2022	Active PAR
<b>PC57.12.53</b>				<b>12/31/2026</b>	
<b>C57.12.23</b>	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
<b>Individual</b>			<b>12/31/2028</b>		
<b>C57.12.24</b>	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
<b>Individual</b>			<b>12/31/2026</b>		
<b>PC57.12.24</b>				<b>12/31/2023</b>	
<b>C57.12.40</b>	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)	David Blew (973) 430-7743 david.blewiv@pseg.com	2017	5/21/2019	ACTIVE + PAR for Revision
<b>Individual</b>			<b>12/31/2027</b>		
<b>PC57.12.40</b>				<b>12/31/2023</b>	
<b>C57.12.44</b>	IEEE Standard Requirements for Secondary Network Protectors	Mark Faulkner (864) 993-0509 markafaulkner@eaton.com	2014	3/26/2015	ACTIVE + PAR for Revision + 1 PAR Extension
<b>Individual</b>			<b>12/31/2024</b>		Ballot closed on 10/13/2021. Currently in Comment Resolution.
<b>PC57.12.44</b>				<b>12/31/2022</b>	
<b>C57.12.57</b>	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
<b>Individual</b>			<b>12/31/2000</b>		

## **APPENDIX 3**

### **CIGRE Liaison Report**



# CIGRÉ International Council on Large Electric Systems

Liaison Report on SCA2  
Transformers for  
IEEE Transformers  
Committee- Spring 2022  
Meeting

- March 28, 2022



# 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 857: On-Site Assembly, On-Site Rebuild, and On-Site High Voltage Testing of Power Transformers**
  - From Working Group A2.59
  - Brochure published Dec. 2021
- **Brochure 861: Improvements to PD Measurements for Factory and Site Acceptance Tests of Power Transformers**
  - From Joint Working Group A2/D1.51
  - Brochure published Jan. 2022

# SC A2 WG Activities

No.	Working Group	Topic	Status
1	A2/C4.52	HF Transformer and Reactor Models	Active
2	A2.53	FRA Interpretation	Active
3	A2.54	Audible Sound Requirements	Active
4	A2.56	Transformer Efficiency	Active
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

# SC A2 WG Activities

No.	Working Group	Topic	Status
8	A2.61	Best Practices for On-Load Tap Changers (OLTC)	Active
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	Starting

# Upcoming New Working Groups

- A2/D1.66: Breathing systems of liquid filled transformers and reactors
- A2/D1.67: Guideline for Online Dissolved Gas Analysis Monitoring

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

# TF and AG activities

- Advisory Group (AG) Activities
  - Green Book A2.6: Transformer Procurement Process
    - Developed for Users of Power Transformers
      - Specification Development
      - Factory Qualification
      - Design Review
      - Transportation
      - Site Installation
  - Publication by early 2022

# CIGRÉ Session 2022

Preferential Subjects for A2 Papers:

1. Experience and new requirements for transformers for renewable generation
2. Beyond the mineral oil-immersed transformers and reactor
3. Best practices in transformer and reactor procurement

Selected papers notified by April 24, 2022



# Upcoming Events

- **CIGRÉ Session 2022**
  - Palais des Congrès, Paris, France, Aug. 28-Sep. 2, 2022
- **CIGRÉ USNC Grid of the Future**
  - Chicago, IL, November 7-10, 2022
  - Hosted by Commonwealth Edison (comed)
  - Paper manuscripts submitted for review by 7/31/2022
- **CIGRÉ Symposium**
  - Cairns, Australia, September 4-7, 2023
  - Cairns Convention Center
- **CIGRÉ A2 Study Committee Colloquium**
  - Split, Croatia, October 2023

# IEEE Liaison Report

THANK YOU!



## **APPENDIX 4**

### **IEC TC14 Liaison Report**

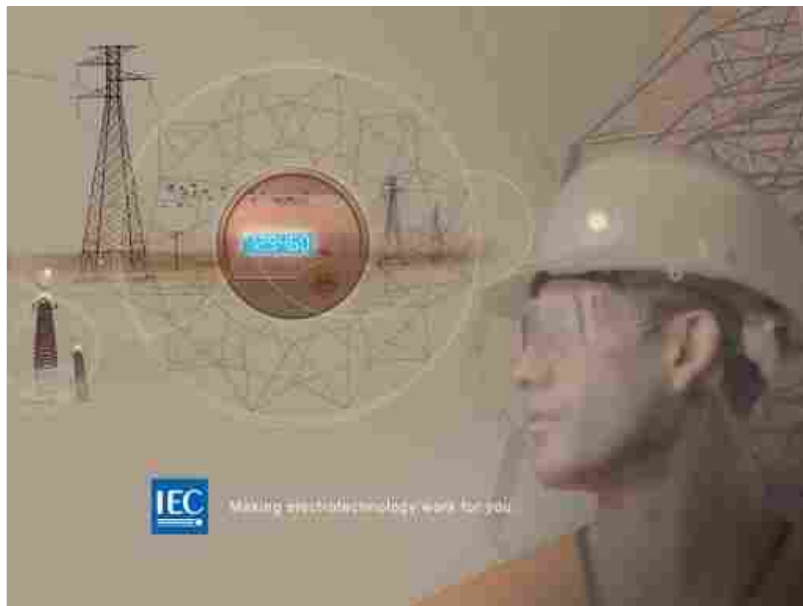


INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

# IEC TC14 Status Report to IEEE Transformers Committee

(as of March 2022)

*Axel Kraemer (DE)*



***Opening Session***

***2022-03-28***

- **Chairman:** *Christoph Ploetner, DE*
- **Secretary:** *Stepanie Lavy, UK (new)*  
*(former secretary Mick Maghar will retire on March 31<sup>st</sup>)*
- **Membership (countries)** **48**
  - **P(articipating) - Members** **35**
  - **O(bserving) - Members** **13**
- **Registered experts** **263**
- **Currently active MT, PT, WG, AHG** **11**
- **Documents in charge of (TR, TS, IS)** **40**
  - **under maintenance / in development** **6 / 2**
  - **IEC/IEEE common documents** **6**
- **Last plenary meeting** **Sep 2019 in Paris**
- **Next plenary meeting** **June 15-16 in Bled, Slovenia**  
**in person (virtual particip. possible)**

### **Maintenance:**

- **IEC 60076-1 General**
- **IEC 60076-2 Temperature rise**
- **IEC 60076-4 Guide to LI and SI testing**
- **IEC 60076-5 Ability to withstand short circuit**
- **IEC 60076-6 Reactors**
- **IEC 60076-19 Uncertainties in Loss Measurements**

### **New document in development:**

- **IEC 60076-25 Neutral Grounding Resistors**

## **Joint Working Group**

- **JWG 7 (TC14 / TC36A) - Dimensional bushing standardization**

## **Joint Ad Hoc Group (new)**

- **JAHG 8 (SC36 / TC14) – Bushing application guide**

## **Advisory Group (new)**

- **AG 37 (TC14) – Monitoring equipment for on-line power transformer surveillance**

## **APPENDIX 5**

### **Standards Coordinating Committee No. 4**



March 28, 2022

**IEEE PES Transformers Committee  
Liaison Report for General Session Meeting – March 28, 2022  
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](mailto:evanne.wang@dupont.com))
- IEEE 1 – Brad Greaves ([brad.greaves@weidmann-group.com](mailto:brad.greaves@weidmann-group.com))

Respectfully submitted,  
Evanne Wang

## **APPENDIX 6**

**ASTM**

# **ASTM Committee D27 Electrical Insulating and Gases Liaison Report**

Thomas Prevost

IEEE/PES Transformers Committee

March 28, 2022

Denver, Colorado

# AGENDA

Introduction to ASTM D27

Current Hot Topics

Future Meetings

# Committee D27 on Electrical Insulating Liquids and Gases

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

# D27 Committee Scope

The promotion of knowledge pertaining to electrical insulating liquids and gases, whether of synthetic or natural origin, and the recommendation of standards pertinent to these materials.

The principal materials included in this scope are oils of petroleum origin, synthetic liquids, halogenated and other gases, when used, singularly or as combinations, as electrical insulation or as an environment for electrical insulation.

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

# Committee Officers

Chairman:	Lance R. Lewand
Vice-chairman:	Edward W. Casserly
Secretary:	Michael Bonn
Staff manager:	Kelly Paul
Admin assistant:	Lindsey Limone
Editor:	Christine Leinweber

# Subcommittees

D27.01 Mineral

D27.02 Gases and Non-Mineral Oil Liquids

D27.03 Analytical Tests

D27.05 Electrical Test

D27.06 Chemical Test

D27.07 Physical Test

D27.15 Planning Resource and Development

D27.90 Executive

D27.91 I.E.C. TC 10 and Advisory

D27.95 Awards, Special Events, and Bylaws.



# ASTM D27 Hot Topics

**Last meeting:** May, 17-18 2021 Virtual

## **Subcommittee Reports**

### **D27.01 - Mineral Oils, Jimmy Rasco:**

- The new standard specification for rerefined mineral insulating oil (WK31231) in ballot resolution. Will be reballoted due to persuasive negatives.

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

# ASTM D27 Hot Topics

## **D27.03 - Analytical Tests, Claude Beauchemin:**

- Item 1. Reapproval of D2144-2007(2013) Practices for Examination of Electrical Insulating Oils by Infrared Absorption
- Item 2. Reapproval of D26687-2007(2013) Test method for 2,6-di-tert-Butyl-pcresol and 2,6-di-tert-Butyl Phenol in Electrical Insulating Oil by Infrared Absorption WK78228
- Item 3 Reapproval of D3635-2013 Test method for Dissolved Copper In Electrical Insulating Oil by Atomic Absorption Spectrophotometry WK78229

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## **D27.05 - Electrical Tests, Sandra Smith:**

## **D27.06 - Chemical Tests, Lance Lewand:**

- Item 1. Reapproval of D2440-2013 Test Method for Oxidation Stability of Mineral Insulating Oil WK78150

# ASTM D27 Hot Topics

## D27.03 - Analytical Tests, Claude Beauchemin:

Standard for analysis of additives in ester insulating liquids under D27.03.

The following Proposed Title / Scope were presented.

Title: Std test method for the determination of additives in insulating liquids – Part 1 – Determination of phenolic antioxidants using liquid chromatography (LC)

Scope: This test method covers the identification and determination of phenolic antioxidants that may be found in insulating liquids by high performance liquid chromatography (HPLC) and ultraviolet (UV) detection. NOTE: Additional parts to the standard, covering other potential additives and other insulating liquids, will be developed as necessary.

# ASTM D27 Hot Topics

**D27.07 - Physical Tests, William Hand:**

**D27.95 - Awards, Special Events, Bylaws, Janet Loyd**

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

- Ballot D27 (21-02) Revision of D2864-2021 Terminology Relating to Electrical Insulating Liquids and Gases

**D27.91 - IEC TC 10 Advisory, Kevin Rapp:**

Kevin Rapp presented the IEC TC 10 Advisory report.

# Future Meetings

May 16-17, 2023

Seattle Washington

October 30 – Nov 1, 2023

New Orleans, Louisiana

## **APPENDIX 7**

### **Transactions Power Delivery**

General Sessions

**Opening Session**

**Monday, March 28, 2022: 8:00 am - 9:15 am MDT (UTC-06:00)**

**10.5. Transactions on Power and Delivery (TPWRD) Editor Liaison**

**Editor's Report (15.03.2022)**

Xose M. LOPEZ-FERNANDEZ

During 2021 and 2022 until March 13, 2022, a total of 131 papers were in 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:	26
Revised & Resubmit	7
Unver review	10
Reject (Administrative/Editorial/Technical):	88
The above numbers include reviews managed by all editors.	

The papers which were accepted for publication are shown below:

DOI /Accepted	Title / Accepted
<a href="#">10.1109/TPWRD.2021.3076871</a>	Vibration and Noise characteristics of Air-Core Reactor Used in HVDC Converter stations
<a href="#">10.1109/TPWRD.2021.3049505</a>	Ageing Analysis of Solar Farm Inverter Transformers
<a href="#">10.1109/TPWRD.2021.3054059</a>	Modified Preisach model of hysteresis in multi air gap ferrite core medium frequency transformer
<a href="#">10.1109/TPWRD.2021.3067863</a>	Double-End Excitation of A Single Isolated Transformer Winding: An Improved Frequency Response Analysis for Fault Detection
<a href="#">10.1109/TPWRD.2021.3070075</a>	Fast and Complete Mitigation of Residual Flux in Current Transformers Suitable for Auto-Reclosing Schemes Using Jiles-Atherton Modeling
<a href="#">10.1109/TPWRD.2021.3085961</a>	Ladder Network Synthesis in Wide Frequency Range for Transformer Winding From its Driving-Point Admittance Data
<a href="#">10.1109/TPWRD.2021.3092397</a>	Improved Approach for Identification of Inter-Turn Fault Location in Transformer Windings using Sweep Frequency Response Analysis
<a href="#">10.1109/TPWRD.2021.3098701</a>	Inclusion of Neutral Points in Measurement-Based Frequency-Dependent Transformer Model
<a href="#">10.1109/TPWRD.2021.3100602</a>	Method for Extracting Stray Capacitance and Hysteresis Curves of Potential Transformers Based on Frequency Referring
<a href="#">10.1109/TPWRD.2021.3102075</a>	Prediction of Insulation Sensitive Parameters of Power Transformer using Detrended Fluctuation Analysis Based Method
<a href="#">10.1109/TPWRD.2021.3103455</a>	Early Warning of Incipient Faults for Power Transformer Based on DGA Using a Two-Stage Feature Extraction Technique
<a href="#">10.1109/TPWRD.2021.3105459</a>	A Top-Oil Thermal Model for Power Transformers that Considers Weather Factors
<a href="#">10.1109/TPWRD.2021.3106709</a>	Load Transfer Optimization Considering Hot-spot and Top-oil Temperature Limits of Transformers
<a href="#">10.1109/TPWRD.2021.3111709</a>	A Novel Methodology to Estimate the Nonlinear Magnetizing Characteristic of Single-Phase Transformers using Minimum Information

<a href="#">10.1109/TPWRD.2021.3119272</a>	New Compact White-Box Transformer Model for the Calculation of Electromagnetic Transients
<a href="#">10.1109/TPWRD.2021.3121472</a>	Using Deep Neural Networks for On-Load Tap Changer Audio-based Diagnostics
<a href="#">10.1109/TPWRD.2021.3128623</a>	A Risk Assessment for Utilities to Prevent Transformer OLTC Failures Caused by Silver Sulphide Corrosion
<a href="#">10.1109/TPWRD.2022.3142889</a>	A Reduced Radiator Model for Simplification of ONAN Transformer CFD Simulation
<a href="#">10.1109/TPWRD.2022.3145003</a>	Dynamic Thermal Model for Oil Directed Air Forced Power Transformers with Cooling Stage Representation
<a href="#">10.1109/TPWRD.2022.3145880</a>	Dielectric design of ester-filled power transformers: AC stress analysis
<a href="#">10.1109/TPWRD.2022.3146154</a>	Lifetime Estimation and Optimal Maintenance Scheduling of Urban Oil-Immersed Distribution-Transformers Considering Weather-Dependent Intelligent Load Model and Unbalanced Loading
<a href="#">10.1109/TPWRD.2022.3147410</a>	Application of Polymer Matrix Composites in Large Power Transformer Tanks
<a href="#">10.1109/TPWRD.2022.3148598</a>	Diagnosing disk-space variation in transformer windings using high-frequency inductance measurement
<a href="#">10.1109/TPWRD.2022.3149968</a>	Modeling and Analysis of Power Imbalance for Power Electronics Transformers with Multi-Bus Structure
<a href="#">10.1109/TPWRD.2022.3150303</a>	Analysis and Optimized Design of a Novel Compact Orthogonal Controllable Reactor
<a href="#">10.1109/TPWRD.2022.3152745</a>	Modeling the Aging-dependent Reliability of Transformers Considering the Individualized Aging Threshold and Lifetime

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”: <http://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 2021 and 2022:

Attila Gyore  
David Wallach  
Del Vecchio  
Ed teNyenhuis  
Eduardo García Wild  
Enrique Betancourt  
Gary Hoffman  
Hemchandra M. Shertukde  
Igor Žiger  
Jerry R. Murphy  
Jim Graham  
Jim McBride  
Joseph Tedesco  
Phil Hopkinson  
Sanjib Som  
Scott Digby  
Sheldon Kennedy

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](mailto: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 8**

### **IEEE Staff Update Presentation**

# **IEEE STANDARDS ASSOCIATION - TRANSFORMER COMMITTEE**

**PE/ TRANSFORMERS ADMINISTRATIVE SUBCOMMITTEE**

**SPRING 2022**

**MALIA ZAMAN**

**M.ZAMAN@IEEE.ORG**

# AGENDA

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- SA Updates
- PAR/Standards Status Update
- SCC04 Transition Status Update
- Policy Updates
  - Mandatory Training
  - Participant Behavior Slides
  - Commercial Terms and Normative references
  - Adoption Of Non-IEEE Standards and Specification - Update
  - IEEE SA Contributors Collection
  - Entity Process - Changes
- IEEE/IEC Dual Logo Status
- Annex : Past policy updates

# IEEE-SA UPDATES – PAR/STANDARDS STATUS

## Expiring PARS:

**2022** – 16 PARS are expiring

- 6 PARs in SA Ballot stage
- 10 in WG development stage
- 5 PARS are on the NesCom for March, 2022

**2023** - 22 PARS are expiring

- 2 Pre-ballot stage
- 15 in WG Development stage

## Expiring Standards in 2022

- 8 Stds. will become inactive,
- 1 with no Active PAR

## Expiring Standards in 2023

- 5 Stds. will become inactive
- 1 with no Active PAR

# SCC04 TRANSITION STATUS UPDATE

The SASB moved that the SCC 04 be transitioned into the Standards & Standards Innovations (S&SI) Strategic Management and Delivery Committee (SMDC) and that they shall be recognized by the SASB as Standards Committees:

- SCC04 – Electrical Insulation**

The SASB moved that the newly recognized Standards Committees (that were the former SCCs) be permitted to operate under their current operating procedures until 31 December 2022 or until acceptance by AudCom/SASB of updated operating procedures on the Standards Committee baseline, whichever is sooner.

The intent is for SCC04 to continue discussions with PES or DEI for a future home.

# IEEE SA POLICY UPDATES – MANDATORY TRAINING

There was a Procedures Committee AdHoc on Strengthening Direction and Training Regarding Dominance. The SASB approved the AdHocs proposed changes and the policies to:

- ❑ Ensure that all Working Group Officers have taken
  - ❑ i) the IEEE SA Standards Working Group Chair Fundamentals training and
  - ❑ ii) the Understanding IEEE SA's Antitrust, Competition, and Commercial Terms Policies training prior to or within 60 days of appointment, or as assigned
- Implementation Date: June 2022
- **All Standards Committee officers** serving at the implementation date of 1 June 2022 have until 31 December 2022 to complete this training
- All **Working Group officers** serving at the implementation date of 1 June 2022 have until 31 December 2022 to complete this training.

**Note:** IEEE SA Staff will keep PES informed on updates and rollout plan as the implementation date approaches

# POLICY UPDATES – PARTICIPANT BEHAVIOR

IEEE SA ProCom Strengthening Direction and Training Regarding Dominance ad hoc also proposed additional changes that the IEEE SASB has approved to clause 5.3.3 of the IEEE SASB Operations Manual.

## 5.3.3 Standards development meetings

The IEEE SA Individual method or Entity method participant behavior slide set, as applicable, shall be either *presented at the beginning of every IEEE SA standards development meeting, or distributed prior to the meeting along with the meeting agenda*. If the slides are distributed with the meeting agenda, all meeting participants shall be informed at the beginning of the meeting that participant behavior shall comply with the outlined requirements.

**Slides are located under heading Additional Policies, Procedures, & Documentation:**

**<https://standards.ieee.org/content/ieee-standards/en/about/policies/index.html>**



# PARTICIPANTS IN THE IEEE-SA - INDIVIDUAL METHOD

- Participants in the IEEE-SA “individual process” shall act independently of others, including employers

The IEEE-SA Standards Board Bylaws require that “participants in the IEEE standards development individual process shall act based on their qualifications and experience”

- This means participants:

- ☐ Shall act & vote based on their personal & independent opinions derived from their expertise, knowledge, and qualifications
- ☐ Shall not act or vote based on any obligation to or any direction from any other person or organization, including an employer or client, regardless of any external commitments, agreements, contracts, or orders
- ☐ Shall not direct the actions or votes of other participants or retaliate against other participants for fulfilling their responsibility to act & vote based on their personal & independently developed opinions

- By participating in standards activities using the “individual process”, you are deemed to accept these requirements; if you are unable to satisfy these requirements then you shall immediately cease any participation

# PARTICIPANTS IN THE IEEE-SA “ENTITY METHOD”

Participants in the IEEE-SA “entity process” represent the entity that appointed them

- The IEEE-SA Standards Board Bylaws (clause 5.2.1) states, “entity representative participants in the IEEE standards development entity process are appointed by an entity to represent that entity and act on its behalf”
- This means such participants:
  - May take actions based upon instructions from the entity for which they have been appointed as an entity representative
  - Shall not direct the actions or votes of participants representing another entity or retaliate against other participants for fulfilling their responsibility to act on behalf of another entity
- By participating in activities using the “entity process”, you are deemed to accept these requirements; if you are unable to satisfy these requirements then you shall immediately cease any participation

# POLICY UPDATES – COMMERCIAL TERMS AND NORMATIVE REFERENCES

## Update to Clause 6.4.6 Normative references of the IEEE SASB Operations Manual:

Standards participants ***shall not contribute material that contains commercial terms*** and conditions (see 6.2.2) of which they are aware for inclusion in any draft IEEE standard or that is intended as a normative reference.

1. If the submitter becomes aware of commercial terms and conditions in their Contribution thereafter, they shall promptly inform the Working Group Chair or IEEE SA Program Manager.
2. Any participant who is personally aware of commercial terms and conditions in an IEEE standard, or in material that is normatively referenced, should promptly inform the Working Group Chair or IEEE SA Program Manager.

**Note:** See IEEE SA STANDARDS BOARD OPERATIONS MANUAL 6.2 for more details

<https://standards.ieee.org/about/policies/opman/sect6.html>

IEEE SA STANDARDS BOARD was created and chartered to recommend updates to policy and training material where appropriate.

# ADOPTION OF NON-IEEE STANDARDS AND SPECIFICATION - Update

- A Procedures Committee (ProCom) change request was reviewed and approved by the SASB to update the existing P&P language which was ambiguous with respect to IEEE SA adopting documents

## IEEE SASB Operations Manual

- 5.6 Adoption: The adoption processes within IEEE allow for IEEE standards to be adopted by recognized standards organizations (see 5.6.1) and for IEEE to adopt standards and specifications from other organizations (see 5.6.2).
  - 5.6.1 Process for adoption of IEEE Standards
- 5.6.2.1 Introduction
  - IEEE adopts standards and specifications from organizations, including but not limited to international standards bodies, regional standards bodies, and industry consortia. IEEE SA IPR Staff shall review the original, underlying document proposed for adoption prior to negotiation of a formal written agreement
  - This text removes the ambiguity and allows for the potential adoption of specifications, such as CIGRE

*Note: Changes to take effect in January 2022*

# IEEE SA CONTRIBUTORS COLLECTION

## OVERVIEW

**IEEE SA Contributor Collection is a free, publicly accessible platform dedicated to publishing the documents contributed by participants during the development of IEEE standards.**

- Contributions may be different types of documents ranging from pure research to technical analysis, complete technical specifications and use cases.
- These Contributions may or may not be directly implemented or referenced in the final standard.
- Contributions should be previously submitted to a Standards Project, or will be submitted to a Standards Project when uploaded to the Contributors Collection.
- The contribution submitted will be discoverable, accessible and searchable via the Contributors Collection.
- The Contributor will be provided with a referenceable, permanent link that points to your contribution.

# WHO CAN CONTRIBUTE?

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**Any IEEE SA Working Group participant who wants to provide a referenceable document that is available to the general public may upload documents to the platform.**

- Submitted documents must be created by the contributor, cannot contain material taken from or owned by another source unless documented permission is provided to IEEE SA that permits publication under the selected Creative Commons license
- The documents are vetted for plagiarism and appropriateness prior to acceptance on the platform.

# COPYRIGHT

**There are four types of Creative Commons (CC) licenses that contributors can select as part of their submission**

- **CC BY 4.0 (Attribution only)** allows others to copy, reuse, adapt, and build upon your work, including for commercial purposes, as long as the content is attributed to you.
- **CC BY-SA 4.0 (Attribution-ShareAlike)** allows others to copy, reuse, adapt, and build upon your work, including for commercial purposes, as long as the content is attributed to you and the adapted work is distributed under the same license as the original.
- **CC BY-NC-SA 4.0 (Attribution-Noncommercial-ShareAlike)** allows others to copy, reuse, adapt, and build upon your work for non-commercial purposes, as long as the content is attributed to you and the adapted work is distributed under the same license as the original.
- **CC0 1.0 (Public Domain Dedication)** allows others to copy, reuse, adapt, and build upon your work for any purpose without attribution; all your rights in the work are waived and the work is dedicated to the public domain.

# REFERENCE MATERIAL

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[IEEE SA Contributors Collection](#),

[Submit your documents to the IEEE SA Collaborators Collection](#).

[Submission Guidelines](#)

[Frequently Asked Questions](#)



# REVIEW OF CHANGES OF ENTITY PROCESS

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## ***IEEE SA Standards Board Bylaws Clause 5.2.1.2 Membership requirements for standards developed under the entity method***

### **Changes include:**

- Officers and Ballot Designee of an Entity WG shall be representatives of an Entity Member of SA

**Summary:** Entity Membership is required to hold an officer or designee role in an IEEE SA Entity Working Group

# REVIEW OF CHANGES TO ENTITY PROCESS

- **Every Entity participating in an Entity WG is required to be an Entity Member of SA to become a member and/or hold voting privileges**
- **Entity nonmembers may:**
  - ☐ observe unlimited number of meetings,
  - ☐ obtain read-only access to IEEE repositories of IEEE SA entity standards working group email communications and documentation,
  - ☐ speak at IEEE SA entity standards working group meetings at the discretion of the working group chair
- **Entity nonmember:** a participant representing an entity

**Note:** Non-members are subject to IEEE SA Patent Policy, IEEE SA Copyright policy, disclosure policies, etc.

# 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 extension has been submitted for the December 2021 NESCom meeting
    - IEC COMPLETED CD, IEEE SA Ballot will be during CDV stage
  - **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?

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# ANNEX – PAST TRAINING

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# NEW WG CHAIR GUIDANCE

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- **WG chair fundamentals presentations available -**  
Consisting of modules, Standards Working Group Chair Fundamentals explores the intricacies of Working Group leadership and assists new and aspirational Working Group Chairs in navigating the complexities of the standards development process
  - Now Available in English and Mandarin:
- **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.



# **IEEE SA STANDARDS WORKING GROUP CHAIR FUNDAMENTALS**

- There are 14 Modules available for Working Group Chairs , it is available via the following link :

<https://iln.ieee.org/Public/ContentDetails.aspx?id=AE404C2328DA4A39AAD7AB5117681F05>

- There are also 12 modules available Working group chairs available in Mandarin  
<https://iln.ieee.org/Public/ContentDetails.aspx?id=C08D783819D24C5A9EF37CF41DD17DC7>
- These modules are free for IEEE and IEEE non members as long as you have an IEEE Web account. For non members you may need to create a web account
- The following print screen go through some of the initial process.

# IEEE SA STANDARDS WORKING GROUP CHAIR FUNDAMENTALS

The screenshot shows a web browser window with the IEEE.org website. The URL bar shows a specific content details page. The website header includes navigation links like 'IEEE.org', 'IEEE Xplore Digital Library', 'IEEE Standards', and 'IEEE Spectrum'. A search bar and 'IEEE' logo are on the right. The main content area features the course title 'IEEE SA Standards Working Group Chair Fundamentals' and a 'Course Program' section. To the right, a pricing table lists membership options and their costs, all at \$0.00. Below the table is an 'Add to Cart' button and a link for non-members. At the bottom right, there is a video thumbnail for the course.

## IEEE SA Standards Working Group Chair Fundamentals

**Course Program**

As Chair of an IEEE Standards Working Group, you play a unique role within the IEEE SA. This course will help you confidently execute the duties of that role by providing the information you need to understand both your responsibilities and the environment in which you will operate. This deeper understanding will position you to lead your Working Group through the challenges of drafting and completing an IEEE Standard! Consisting of twelve modules, Standards Working Group Chair Fundamentals explores the intricacies of Working Group leadership and assists new and aspirational Working Group Chairs in navigating the complexities of the standards development process. You will explore topics such as organizational values, legal considerations, processes, the establishment of policies and procedures, and Working Group meeting best practices. The bottom line? You'll complete this course as a better, stronger Chair, knowing how to serve your Working Group with established best practices.

**Audience:** Working Group Chairs and those aspiring to serve as a Chair; working group members, individuals and entities thinking of participating in the IEEE Standards Development process.

**Publication Year:** 2020

IEEE member	\$0.00
IEEE student member	\$0.00
Sponsoring society member	\$0.00
Sponsoring society student member	\$0.00
Non-IEEE member	\$0.00

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[Not a member? Join IEEE](#)

**WORKING GROUP CHAIR FUNDAMENTALS**  
VOLUNTEER TRAINING INITIATIVE

# IEEE SA STANDARDS WORKING GROUP CHAIR FUNDAMENTALS –CONT'D

IEEE.org | IEEE Xplore Digital Library | IEEE Standards | IEEE Spectrum | More Sites

MALIA ZAMAN | Cart (1)

## IEEE CHECKOUT

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General Items

Description	Quantity	Product Price
IEEE SA Standards Working Group Chair Fundamentals Format: Multimedia	1 <a href="#">Remove</a>	\$0.00

**\*Net Amount USD: 0.00**

Items in your cart will remain for up to 30 days and will always reflect the most current price and availability.

[Proceed to Checkout](#) [Questions?](#)

# IEEE SA STANDARDS WORKING GROUP CHAIR FUNDAMENTALS –CONT'D

The screenshot shows a web browser window with the URL [ieeeproc.org/cart/order/viewConfirmation.html?orderId=17hwMFYwq86pRnFL2Mw53D%3D&transGradeCode=INDV](https://ieeeproc.org/cart/order/viewConfirmation.html?orderId=17hwMFYwq86pRnFL2Mw53D%3D&transGradeCode=INDV). The page displays a confirmation message and a table of items.

Thank you for your order. You will receive an order confirmation email at mella.zama@gmail.com. [Expand panel to show video](#)

Please note the following about Resource Center product(s) you just purchased:

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- For webinar registration(s), please note that you will receive additional information regarding the upcoming live event(s) via email shortly.
- To view or download content included in a bundle, please click on the name of the product in question below.

General Items						
Description	Quantity	Shipping	Product Price	Tax Rate	Tax Amount	Product Total
IEEE SA Standards Working Group Chair Fundamentals Format: Multimedia	1		\$0.00			\$0.00

**Order details:**  
Order number: 1-16737189556  
Date: 06-Jan-2021  
Member/Customer number: 07531823

At the bottom of the browser window, there are open tabs for 'Agenda\_TC109...docx' and 'Standards Develo...pptx'.

# IEEE SA STANDARDS WORKING GROUP CHAIR FUNDAMENTALS –CONT'D

The screenshot shows a web browser window displaying the IEEE Standards Working Group Chair Fundamentals course page. The browser's address bar shows the URL: <https://ieeexplore.ieee.org/ContentDetails.aspx?id=AE404C2326DA4A399AD7AB5117681F05>. The page features a blue header with navigation links and a main content area with a video player and a list of course modules.

**Expand panel to show video**

**WORKING GROUP CHAIR FUNDAMENTALS**

**Course Overview / Standards Association**

**Course Length: 4 SAPs**

**Course: SA-STD-4-PPE**

**This 10-hour course program:**

**IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals**

**14 TOPIC (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC) (14 TOPIC)**

Topic	Quantity	Status	Expected Duration
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Course Introduction	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 1: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 2: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 3: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 4: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 5: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 6: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 7: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 8: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 9: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour
IEEE SA-STD-4-PPE Standards Working Group Chair Fundamentals: Module 10: Introduction to Standards Working Group Chair Fundamentals	1	Not Started	1 hour

Agenda\_TC109...docx Standards Develo...pptx

Show all

# WORKING GROUP AWARDS

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- On 1 July 2021, IEEE SA added a Working Group Awards Submission feature to its myProject application.
- This feature allows a Working Group Chair or Vice-Chair to populate a list of award recipients based on the participation levels set for your Working Group participant list.
- The system will automatically pull the recipient's address from their IEEE account profile if they have provided one.
- You can then select the type of award the individual should receive and a delivery method.
- Plaques are typically provided to the Working Group Officers and certificates to the members. Once all selections are made, the information can be submitted to the IEEE SA Awards Administrator for processing.
- The feature will be available for standards approved after 22 September 2021, and is preferred. [Working Group Awards](#) submissions via the existing method will continue to be available until further notice.
- For detailed instructions on how to use the new feature, please see the following document:  
<https://sagroups.ieee.org/myproject-help/wp-content/uploads/sites/135/2021/07/Working-Group-Awards-Help.pdf>.
- If you have any questions, please contact [WG-Awards@ieee.org](mailto:WG-Awards@ieee.org) or your Program Manager

# **DRAFT SHARING POLICY**

- DRAFTS SHARING METHODS AVAILABLE:
- SHARING DRAFTS WITH IEEE SA WORKING GROUPS AND IEEE STANDARDS COMMITTEES
- SHARING DRAFTS WITH ORGANIZATIONS EXTERNAL TO IEEE
- *IEEE SA Standards Board Operations Manual*  
<https://standards.ieee.org/about/policies/opman/sect6.html>



# SHARING DRAFTS WITH IEEE SA WORKING GROUPS

## AND IEEE STANDARDS COMMITTEES

Any IEEE SA Working Group may:

- Decide to share their draft with another IEEE SA Working Group or IEEE Standards Committee; or
- Receive a request for a copy of their draft from another IEEE SA Working Group or IEEE Standards Committee

**It is the decision of the IEEE SA Working Group developing the draft to share the draft.**

- It is recommended that the Working Group vote on sharing the draft.

**If the Working Group developing the draft decides to share the draft, the Working Group Chair:**

- Shall ensure that the draft is in the **IEEE SA template** for draft standards and that the **cover page** provided by their Program Manager (PM) is inserted as the first page of the .pdf file of the draft prior to sharing the draft.
- Sends the draft to the **IEEE SA Working Group Chair** or IEEE Standards Committee Chair with whom the draft is being shared, copying their **IEEE Standards Committee Chair, Program Manager** and IEEE SA Intellectual Property Rights ([stds-copyright@ieee.org](mailto:stds-copyright@ieee.org)).

**If the Working Group developing the draft decides not to share the draft, the Working Group Chair should:**

- Provide the rationale to the Working Group or Standards Committee requesting the draft, and
- Copy their Standards Committee Chair and Program Manager on the rationale.



# SHARING DRAFTS WITH ORGANIZATIONS EXTERNAL TO IEEE

The sharing of drafts with organizations external to IEEE is done in accordance with [subclause 6.1.3.4](#) of the *IEEE SA Standards Board Operations Manual*, “Draft distribution for coordination.”

- A draft sharing relationship with an organization external to IEEE must be established by IEEE SA prior to the IEEE SA WG sharing the draft.
- A list of established relationships for the purposes of draft sharing is available on the [Working Group Draft Sharing List for Coordination](#).
  - If the IEEE SA WG believes that the draft sharing relationship has already been established, the WG Chair should contact the Program Manager.
- The Working Group Chair reviews the [Working Group Draft Sharing List for Coordination](#) to determine if the draft sharing relationship has been established.
  - If the IEEE SA WG does not have a draft sharing relationship established with a specific technical group in an organization external to IEEE (even if another IEEE SA Working Group has an established relationship with the same technical group), the relationship with the specific technical group must first be established by IEEE SA prior to sharing the draft (see Slide 8 - “Establishing the Draft Sharing Relationship”).
  - If the draft sharing relationship has been established:
    - If the [Working Group Draft Sharing List for Coordination](#) indicates “Yes” under the column “Seek PM Guidance”, the Working Group Chair shall contact the PM prior to sharing the draft.
    - If the [Working Group Draft Sharing List for Coordination](#) indicates “No” under the column “Seek PM Guidance”, the draft can be shared (see Slide 9 - “Sharing the Draft” for steps to be taken).

Note: Additional steps may be needed as some organizations external to IEEE have their own processes.

# ESTABLISHING THE DRAFT SHARING RELATIONSHIP

The IEEE SA WG submits the form “[Request for Sharing Drafts with Organizations External to IEEE](#)”, requesting to establish a draft sharing relationship with a technical group in an organization external to IEEE.

- It is recommended that the Working Group vote to establish the draft sharing relationship.

The IEEE SA Program Manager will inform the IEEE SA Working Group of the status of the request.



# SHARING THE DRAFT/MAINTAINING THE DRAFT SHARING RELATIONSHIP

## Sharing the Draft

- Once the draft sharing relationship has been established, the process for sharing the draft is as follows:
  - The IEEE SA Working Group Chair completes the Cover Letter provided by the IEEE SA Program Manager and shall insert the cover letter as the first page of the draft standard in PDF format.
  - The IEEE SA Working Group Chair sends the combined PDF to the technical group in the organization external to IEEE, copying the Program Manager and IEEE SA Intellectual Property Rights ([stds-copyright@ieee.org](mailto:stds-copyright@ieee.org)).
  - The IEEE SA Working Group is responsible for considering the information or feedback related to drafts received from the technical group in the organization external to IEEE.

## Maintaining the Draft Sharing Relationship

- The IEEE SA Working Group Chair is responsible for reviewing the draft sharing relationship annually with the Working Group to ensure that it continues to be productive.
  - If the relationship is no longer productive, the IEEE SA Working Group or Standards Committee Chair shall inform IEEE SA Intellectual Property Rights ([stds-copyright@ieee.org](mailto:stds-copyright@ieee.org)) and their Program Manager.
- Note: The Draft sharing “Cover Letter” is an actual letter only to be used when sharing drafts with organizations external to IEEE.*

# ADOPTIONS

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- A Procedures Committee (ProCom) change request was reviewed and approved by the SASB to update the existing P&P language which was ambiguous with respect to IEEE SA adopting documents

## IEEE SASB Operations Manual

- **5.6 Adoption:** The adoption processes within IEEE allow for IEEE standards to be adopted by recognized standards organizations (see 5.6.1) and for IEEE to adopt standards and specifications from other organizations (see 5.6.2).
  - **5.6.1 Process for adoption of IEEE Standards**
  - **5.6.2.4 Adoption of standards and specifications**
    - This text removes the ambiguity and allows for the potential adoption of specifications, such as CIGRE

*Note: Changes to take effect in January 2022*

# QUESTIONS?



# CONTACT US!

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**Malia Zaman**  
**Senior Program Manager**  
[M.zaman@ieee.org](mailto:M.zaman@ieee.org)  
**(732) 850 6608**

## **APPENDIX 9**

### **Meeting Planning**

# SC Meetings Planning

## Spring 2022 Meeting

### Denver, CO

### Subcommittee Meeting

### March 30, 2022



# Tammy Behrens

## Prolec-GE Waukesha, Inc.

### Meetings Subcommittee Chair

# SAFETY

# THANK YOU TO OUR MEETING HOSTS!



**Jeff Gragert & Team**

**AND TO DUKE ENERGY  
FOR HOSTING OUR NEXT  
MEETING IN CHARLOTTE!**

# Meeting Feedback DISCUSSION

# Meetings Subcommittee Updates

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

- 
- Registration Desk
    - Jennifer Quandel

*Tom Prevost*

# TUTORIALS

*Ed Smith*

# BREAK SPONSORS



*Sue McNelly*

WEBSITE

[spmcnelly14@gmail.com](mailto:spmcnelly14@gmail.com)

*David Wallach*

# MEETING APP

IEEE

EventHub



*Jerry Murphy*

# MEETING SCHEDULE

*Greg Anderson*  
*Kris Zibert & Dan Weyer*

# New AMS & RFID

# Future Meetings

FALL 2022 — October 16-20  
Charlotte, North Carolina USA  
Sheraton / Le Méridien

SPRING 2023 — March 19-23  
Milwaukee, WI USA  
Hyatt Regency\*

FALL 2023 — October 22-26  
Kansas City, MO USA  
Westin Kansas City at  
Crown Center\*



*Charlotte meeting hosted by*



\* Addendums completed with more favorable cancellation/reduction terms.

# Considerations for Future Meeting Sites

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

# Volunteer Opportunities

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

NOTE: The hotel will have all the cords run, so all that needs to be done is get the projectors into the meeting rooms before the start of the day's meetings, plug them in and turn them on to verify correct placement on the projector carts; in the evening, just unplug them (you can leave the power cords in the rooms) and bring them back to the storage room for safe keeping.

- At the beginning of each day, remove the prior day's schedule so the current day's schedule is on top on the sign in front of each meeting room; verify each room's schedule against the printed schedule/Guidebook — need one person for Monday through Wednesday
- Daily meeting room review (water stations replenished, chairs placed properly, tables wiped down, dirty dishes/glasses removed at breaks, etc.); work with the hotel to make sure these things are in order at the beginning of every day and throughout the day, as needed — need one point person for Monday through Wednesday
- Help with registration during peak times (Sunday PM and Monday AM)— need 2 people
- Be available throughout the meeting to answer technical questions about the Committee, i.e. how to become a CM, how to become an official member of a WG/TF, etc.
- TASK FORCE: I would like to see a task force formed to help with finding technical tour and other activity opportunities in the cities in which we choose to have our meetings.

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



# Meeting Attendance

	2019 Spring Anaheim	2019 Fall Columbus	2020 Spring Charlotte	F20, S21, F21 VIRTUAL	2022 Spring Denver
<b>Attendees</b>	<b>596</b> (605 – 9)	<b>603</b> (606 – 3)	<b>538</b>  <b>CANCELLED</b>	<b>508</b> <b>549</b> <b>526</b>	<b>385</b> (393 – 8)
<b>Spouses/ Companions/ Guests</b>	<b>79</b> (80 – 1)	<b>47</b> (48 – 1)			<b>24</b> (24 – 0)

# Meeting Attendance

Attendees: 385

Spouses/Companions/Guests: 24

Sunday Event: 262 (vs. 420 in Columbus, 475 in Anaheim, 439 in Jacksonville, 424 CAPACITY in Pittsburgh, 423 in Louisville REGISTERED FOR FREE RECEPTION)

Mon Standards Lunch: 176 signed up (vs. 247/209/225/234/230 in COL/ANA/JAX/PIT/LOU)

Tues Awards Lunch: 203 signed up (vs. 255/238/245/271/257 in COL/ANA/JAX/PIT/LOU)

Wed Night Dinner Social: NO EVENT SCHEDULED (vs. 163/240/191/NA/212 COL/ANA/JAX/ PIT/LOU)

**Web password for  
subcommittee private directory  
(transformer/subcommittee/  
private folder):**

**P\$4acc+Rcs**

**user name (as always): xfmrcom**

***EFFECTIVE NOVEMBER 19, 2021***

**As you're leaving...**

**DROP YOUR PLASTIC  
NAME BADGE HOLDER  
AND CLIP IN BOXES  
AROUND HOTEL**

**Thank you and travel home safely!**

## **APPENDIX 10**

### **Treasurer's Report**

# MEMORANDUM

March 10 2022

To: Ed teNyenhuis, Chair  
IEEE PES Transformers Committee

RE: IEEE PES Transformers Committee Treasurer's Report  
Spring 2022 Meeting  
(for reporting period 09/01/2021 to 01/31/2022)

Dear Ed,

The finances of the Committee are in sound condition. As of January 31st (end of this reporting period), the balance in our account was \$152,072.00.

FYI: January 31st was essentially a "snap-shot in time" after all income & expenses were resolved from the previous Fall 2021 virtual meeting and before we started spending significant funds for the Spring 2022 Denver Meeting.

Report period highlights include,

- the Spring 2021 and Fall 2021 meetings reported profits because of lower expenses associated with virtual meetings,
- a 2021 Audit will not be required because we do not meet the minimum revenue/expense threshold.

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 2022**  
**(for reporting period 09/01/2021 to 01/31/2022)**

AAAAA	Balance before Spring 2020 Meeting, as of 01/31/2020	\$119,318.89
AAAA	Balance before Fall 2020 Meeting, as of 08/31/2020	\$110,945.49
AAA	Balance before Spring 2021 Meeting, as of 1/31/2021	\$139,774.19
AA	Balance before Fall 2021 Meeting, as of 8/31/2021	\$163,032.50

**Misc Income, not related to a specific meeting**

B.1	interest, approx 6 months	\$206.53
B.2	misc income; shirt sales, CD-ROM sales, book sales, etc.	\$0.00

<b>B</b>	Total Misc Income, not meeting related	\$206.53
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**Misc Expenses, not related to a specific meeting**

c.1	subscription fees, 123Signup, Authorized Net, Paypal	(\$258.10)
c.2	awards	(\$135.70)
c.3	equipment purchases; projectors & cases, etc.	\$0.00
c.4	technology; RFID tech, meeting app, WiFi equip, printers & ink, cables, etc	\$0.00
c.5	conferences, PES GM, remote meetings, etc.	\$0.00
c.6	other misc. expenses; shirts, audit, books, office supplies, name badges, etc.	\$0.00
c.7	memorial	\$0.00

<b>C</b>	Total Misc. Expenses, not meeting related	(\$393.80)
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**Spring 2021 Meeting**

D.1	late income, meeting registrations (rolling reserve paybacks)	\$0.00
D.2	misc late income (incentives, late sponsor contributions, etc.)	\$0.00
D.3	late meeting expenses	(\$95.50)

<b>D</b>	Total Late Income/(expenses), Spring 2021 Meeting	(\$95.50)
	reported prelim. gain/(loss), as of 08/31/2021, from previous Treasurer's Report	\$20,812.30
	Actual Gain/(Loss), Spring 2021 Meeting	\$20,716.80

**Fall 2021 Meeting**

E.1	income, meeting registrations	\$73,480.00
E.2	income, coffee break sponsors	\$0.00
E.3	meeting expenses	(\$54,424.40)

<b>E</b>	Income minus expenses (between 09/01/2021 and 01/31/2022)	\$19,055.60
	meeting income (expenses), before 08/31/2021	\$0.00
	<u>Preliminary Gain/(Loss), Fall 2021 Meeting</u>	\$19,055.60

**Expenses, Future Meetings (deposits paid, etc)**

FF	future meeting income (expenses), paid 02/01/2021 to 08/31/2021	\$0.00
FFF	future meeting income (expenses), paid 09/01/2021 to 01/31/2022	(\$10,000.00)

<b>G</b>	<b>Net Income (loss), between Spring 2021 and Fall 2021 meetings (B+C+D+E)</b>	<b>\$18,772.83</b>
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<b>A</b>	<b>Balance before Spring 2022 Meeting , as of 01/31/2022 [ (AA + FFF) + G ]</b>	<b>\$171,805.33</b>
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\* Note - This balance includes the transfer forward of three previous sponsorships.

### IEEE PES Transformers Meeting Related Rev / Exp Detail (U-General, S-Spring Meeting, F-Fall meeting)

Sum of Credit/(Debit)		Meeting											
Category	Subcategory	23S	22U	22S	21U	21S	21F	20U	20S	20F	19U	19S	19F
1.2	Corporate			\$7,500.00								\$7,500.00	\$7,500.00
1.2 Total				\$7,500.00								\$7,500.00	\$7,500.00
2.1	Commission Meeting												
						\$75,230.00	\$73,480.00		\$10.75	\$69,430.00		\$3,551.74	\$2,896.09
2.1 Total						\$75,230.00	\$73,480.00		\$10.75	\$69,430.00		\$258,055.05	\$238,335.85
3.4	Interest												
			\$43.58		\$504.06			\$1,120.84				\$2,097.59	
3.4 Total			\$43.58		\$504.06			\$1,120.84				\$2,097.59	
4.1	Meeting Shipping Social Venue 123Signup RFID Award	(\$10,000.00)	(\$40.00)		(\$433.10)	(\$54,513.20)	(\$53,624.40)	(\$35.00)	(\$567.66)	(\$40,457.90)		(\$237,177.49)	(\$186,025.19)
									(\$541.56)	(\$631.18)		(\$1,199.65)	(\$858.52)
									(\$500.00)			(\$64,833.01)	(\$25,839.53)
												(\$543.84)	
								(\$703.80)			(\$535.98)		
								(\$270.59)				(\$3,397.99)	(\$3,401.01)
					(\$305.91)				(\$188.91)				
4.1 Total		(\$10,000.00)	(\$40.00)		(\$739.01)	(\$54,513.20)	(\$53,624.40)	(\$1,009.39)	(\$1,798.13)	(\$41,089.08)	(\$535.98)	(\$307,151.98)	(\$216,124.25)
4.9	Other PES Audit												
								(\$555.84)			(\$40.00)		
											(\$5,996.69)		
											(\$3,246.78)		
4.9 Total								(\$555.84)			(\$9,283.47)		
5.3	Contractor						(\$800.00)		(\$3,500.00)			(\$10,359.03)	(\$9,958.86)
5.3 Total							(\$800.00)		(\$3,500.00)			(\$10,359.03)	(\$9,958.86)
Grand Total		(\$10,000.00)	\$3.58	\$7,500.00	(\$234.95)	\$20,716.80	\$19,055.60	(\$444.39)	(\$5,287.38)	\$28,340.92	(\$7,721.86)	(\$48,404.22)	\$22,648.83

Values are reported as YTD so current and future meeting revenue and expenses are reported as of the reporting date.

Categories based on IEEE statement of accounts

1.2 Corporation are donations mainly for meeting breaks, corporate donors requested break sponsorship funds be reassigned from F21 to S22.

2.1 Commission Revenue, A/V and F/B are typically be rolled into the 4.1 Meeting Expense based on hotel invoice

4.1 Meeting expenses including credit card company fees from registration

4.1 Venue includes site visits to evaluate properties

4.9 Audit charges from previous year invoiced and paid during current year

4.9 PES for AdComm Officer PES meeting attendance

7.0 Asset is revenue for sold equipment or reimbursed by hotel, Other for rev/exp not otherwise assigned.



## ANNEX A Bushings Subcommittee

Denver, Colorado, USA  
March 30<sup>th</sup>, 2022, 09:30AM Mountain

Chair:	Eric Weatherbee, Hubbell Power Systems / PCORE Electric
Vice-Chair (presiding officer):	Scott Digby, Duke Energy
Secretary (Open):	Open Role

(SC Member, Cihangir John Sen took notes and assisted in preparation of these minutes)

### A.1 Opening of the Meeting

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

The SC Chair was not able to attend the Spring 2022 meeting, so the SC Vice Chair presided over the meeting.

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

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

The Vice Chair advised that updates and/or documents that need to be posted to the website need to be transmitted to [tc-webmaster@ieee.org](mailto:tc-webmaster@ieee.org). It was noted that the transformer committee webmaster had recently retired so their previous work email is no longer valid.

The Vice Chair noted that some mandatory WG Chair training would be forthcoming. Implementation is expected to be in June-2022, with completion of the training required by December-2022. More information will be shared as it becomes available.

The Bushings SC currently has a vacant Secretary position, the Vice Chair asked that any interested individuals contact the SC Chair or Vice Chair by email or in-person after the meeting.

#### A.1.2 Reminders of IEEE policies

The Vice Chair presented 2 slides which included hyperlinks which details the IEEE SA Copyright Policy. Slides advised those present that by participating in this meeting they agree to comply with the IEEE code of ethics, all applicable laws, and all IEEE policies and procedures, including the IEEE SA Copyright Policy.

#### A.1.3 New Members

It was reported that 6 new members have been accepted into the Subcommittee, each of whom were recognized. These new members are Muhammad Ali Masood Cheema, Juan Carlos Cruz Valdes, Ismail Gruner, Parminder Panesar, Cihangir Sen, and Christopher Whitten.

#### A.1.4 Attendance

Participant rosters were circulated during the meeting for recording the meeting attendance. The Vice Chair presented a list of the 75 current voting members to perform a quorum check. Quorum was unable to be achieved. Per subsequent review of the rosters the meeting had 85 attendees, of which 33 were members and 52 guests, with 11 guests requesting membership. Refer to [Appendix A](#) for meeting participants, their affiliation, and voting member status.

**Table 1 – Meeting Attendance**

Total	85
Members	33
Guests	52
Guests Requesting Membership*	11

\*Review of the historical attendance records indicate that of the 11 guests requesting membership, 8 meet the eligibility requirements (Mubarak Abbas, Onome Avonoma, Barry Beaster, Evgenii Ermakov, Marco Espindola, Jose Gamboa, Emilio Morales-Cruz, and Diego Robalino) and will be added to the membership roster effective at the next SC meeting.

#### **A.1.5 Agenda Approval**

As a quorum was not achieved the proposed agenda could not be formally approved. Since there were no comments regarding the proposed agenda the meeting proceeded thru the agenda as proposed.

#### **A.1.6 Previous Meeting's Minutes Approval**

As a quorum was not achieved the previous meeting minutes could not be approved.

#### **A.1.7 Status of Bushing Standards**

The Vice 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**

With the WG officers unable to attend and with their being no WG meeting held this week, the SC Vice Chair provided a brief report of the status of this WG based on an update received from the WG Chair. The current Draft is considered complete, after 11 meetings, with a recent unanimous vote (via email) of the WG approving all recent revisions. Draft D2 is posted on the website. The next step is for the WG to vote on approval of Draft D2 to send for Sponsor ballot, which is planned to be executed via email soon. Upon obtaining that approval the WG Chair would then seek approval from SC to send for sponsor ballot, which is also expected to take place via email. The WG Chair has developed a Comment Resolution Group with leads for specific sections of the document: Peter Zhao for Section 1, 2, & 4, Eric Weatherbee for Section 3, Scott Digby for Section 5, Art Del Rio for Section 6, and Shibao Zhang for Section 7.

Par expires at the end of 2022.

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

No meeting held as the latest revision was recently published and is not due for revision again until closer to the document's 2027 expiration date.

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

See complete WG minutes in [Appendix C](#) of this report.

The WG Chair reported that they were not able to achieve quorum at their meeting. It was reported that the document is currently out for ballot, with a close date of April 4<sup>th</sup>. A Comment Resolution Group (CRG) was formed to manage the ballot comments that are received. Since quorum was not achieved, the WG Chair intends to schedule a virtual meeting to get the Fall-2021 and Spring-2022 minutes approved and to affirm the work of the CRG in support of the resolution and subsequent ballot recirculation process(es). The goal is to have the document submitted to RevCom this fall.

PAR expires at the end of 2022.

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

See complete WG minutes in [Appendix D](#) of this report.

WG Secretary Mr. Del Rio reported that there were 8 attendees at the WG meeting this week, noting that the low attendance could partially be due to another WG meeting scheduled during the same time slot that also deals with the topic of bushings. Joint IEC/IEEE WG virtual meetings had been held on February 15<sup>th</sup> and 16<sup>th</sup>, at which three task forces were formed to address certain areas. Two items of new business were introduced, one concerning how to proceed with updates to section 6 and the other on the need for nameplates for oil type bushings to include PCB content information.

The next joint IEC/IEEE WG meetings are scheduled for May 31<sup>st</sup> and June 1<sup>st</sup>. The WG also plans to meet during the F22 Transformer Committee meeting in Charlotte.

**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.

**A.2.6 WG PC57.19.100-2012 – Tommy Spitzer, Chair; **VACANT, Vice-Chair**; **VACANT, Secretary****

See complete WG minutes in [Appendix E](#) of this report.

The WG Chair reported that Draft 3 of the document is being re-circulated for comments and that comments received will be discussed at the F22 WG meeting. The existing 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, which was reviewed. This summary report is included in [Appendix F](#) of this report.

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

The WG Chair was not in attendance. No report was available during the SC meeting.

**A.3.3 PC57.12.200 Dielectric Frequency Response (DFR) Test for Bushings – TF Entity Ballot Oversight – Poorvi Patel**

Dr. Patel was not in attendance. No report was available during the SC meeting.

**A.3.4 Amendment to IEEE 693, Recommended Practice for the Seismic Design of Substations - Durand Stacy**

Mr. Stacy was not in attendance. SC Chair Eric Weatherbee had prepared a report in the form of a series of slides with audio voice-over, which was played during the meeting. The report slides are included in [Appendix G](#) of this report.

### **A.4 Unfinished Business**

**A.4.1 Venting/PD in OIP Bushings during FAT**

The VC advised that the topic concerning the practice of venting OIP bushings during transformer FAT in response PD activity is still active. The discussion currently resides under the Dielectric Test SC.

The Bushing SC Chair has been in discussions with the Dielectric Test SC Chair as next steps have been reviewed and will continue to monitor the status of the item.

**A.5 New Business**

**A.6 Adjournment**

**A.7 Next Meeting: Fall 2022, Charlotte, North Carolina - October 16 – 20, 2022**

First Name	Last Name	Affiliation	Role
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
J. Arturo	Del Rio	Siemens Energy	Member
Scott	Digby	Duke Energy	Vice-Chair
Huan	Dinh	Hitachi Energy	Member
Eric	Euvrard	RHM International	Member
Hugo	Flores	Hitachi Energy	Member
Eduardo	Garcia Wild	Siemens Energy	Member
Niklas	Gustavsson	Hitachi Energy	Member
Kurt	Kaineder	Siemens Energy	Member
Egon	Kirchenmayer	Siemens Energy	Member
Marek	Kornowski	Polycast International	Member
Axel	Kraemer	Maschinenfabrik Reinhausen	Member
Kumar	Mani	Duke Energy	Member
Robert	Middleton	RHM International	Member
Poorvi	Patel	Electric Power Research Institute (EPRI)	Member
Ulf	Radbrandt	Hitachi Energy	Member
Scott	Reed	MVA	Member
Amitabh	Sarkar	Virginia Transformer Corp.	Member
Steven	Schappell	SPX Transformer Solutions, Inc.	Member
Ewald	Schweiger	Siemens Energy	Member
Cihangir John	Sen	Duke Energy	Member
Stephen	Shull	BBC Electrical Services, Inc.	Member
Sanjib	Som	Pennsylvania Transformer	Member
Thomas	Spitzer	City Transformer Service Co.	Member
Brad	Staley	Salt River Project	Member
Troy	Tanaka	Burns & McDonnell	Member
Alwyn	Van Der Walt	Electrical Consultants, Inc.	Member
Ajith	Varghese	SPX Transformer Solutions, Inc.	Member
David	Wallach	Duke Energy	Member
Mubarak	Abbas	Siemens Energy	Guest
Stephen	Antosz	Stephen Antosz & Associates, Inc	Guest
Elise	Arnold	SGB	Guest
Onome	Avanoma	MJ Consulting	Guest
Barry	Beaster	H-J Family of Companies	Guest
Jeremiah	Bradshaw	Bureau of Reclamation	Guest
Juan Alfredo	Carrizales	Prolec GE	Guest
Larry	Christodoulou	Electric Power Systems	Guest
Evgenii	Ermakov	Hitachi Energy	Guest

Marco	Espindola	Hitachi Energy	Guest
Jose	Gamboa	H-J Family of Companies	Guest
Orlando	Giraldo	H-J Family of Companies	Guest
Shamaun	Hakim	WEG Transformers USA Inc.	Guest
Derek	Hollrah	Burns & McDonnell	Guest
Nicholas	Jensen	Delta Star Inc.	Guest
Stephen	Jordan	Tennessee Valley Authority	Guest
Akash	Joshi	Black & Veatch	Guest
Jerzy	Kazmierczak	Hitachi Energy	Guest
Emilio	Morales-Cruz	Qualitrol Company LLC	Guest
Ryan	Musgrove	Oklahoma Gas & Electric	Guest
Brady	Nesvold	Xcel Energy	Guest
Nitesh	Patel	Hyundai Power Transformers USA	Guest
Adnan	Rashid	Measurement Canada / ISED	Guest
Diego	Robalino	Megger	Guest
Zoltan	Roman	GE Grid Solutions	Guest
Hakan	Sahin	Virginia/Georgia Transformer	Guest
Markus	Schiessl	SGB	Guest
Alfons	Schrammel	Siemens Energy	Guest
Jonathan	Sinclair	PPL Electric Utilities	Guest
Brian	Sparling	Dynamic Ratings, Inc.	Guest
Kyle	Stechschulte	American Electric Power	Guest
Hampton	Steele	Tennessee Valley Authority	Guest
Andrew	Steineman	Delta Star Inc.	Guest
Charles	Sweetser	OMICRON electronics Corp USA	Guest
Mark	Tostrud	Dynamic Ratings, Inc.	Guest
Deniss	Villagran	GE Grid Solutions	Guest
Benjamin	Riggins	Xcel Energy	Guest
David	Burke	Xcel Energy	Guest
Mama	Mbouombouo	Hitachi Energy	Guest
Anthony	McGrail	Doble	Guest
Robert	Vantol	Commonwealth Assoc.	Guest
Erick	Sato	Siemens Energy	Guest
Daniel	Posadas	Prolec St de CV	Guest
Olivia	Cordova	Bureau of Recl.	Guest
Samson (Sami)	Debass	EPRI	Guest
Alex	Alahmed	Evergy - Wolf Creek	Guest
Jean-Nobel	Berube	Rugged Monitoring	Guest
Jennie	Aldenlid	Hitachi Energy	Guest
Alexander	Doutrelepoint	Siemens Energy	Guest
Jonathan	Deverick	Dominion Energy	Guest
Phil	Swan	Resa Power	Guest
Sanjay	Patel	SGB SMIT	Guest

Standard Project	Title	WG Chair	Pub Year Rev. Due Date	PAR Issue Par Expiration	Comments
<a href="#">PC57.19.00</a>	IEEE Standard General Requirements and Test Procedure for Power Apparatus Bushings	P. Zhao	2004 12/2020	2018 12/2022	WG Draft Development Considered not active but is still available
C57.19.01	IEEE Standard Performance Characteristics and Dimensions for Outdoor Apparatus Bushings	S. Zhang	2017 12/2027		1st review meeting was held during S21 meeting. Evaluate again in ~2 years.
<a href="#">PC57.19.02</a>	Standard for the Design and Performance Requirements of Bushings Applied to Liquid Immersed Distribution Transformers	S. Shull	New	2016 12/2022	WG Draft Development
<a href="#">P65700-19-03</a>	IEC/IEEE International Standard – Bushings for DC application	Interim Eric Weatherbee	2014 12/2024	2021 12/2025	WG Draft Development
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		
<a href="#">PC57.19.100</a>	IEEE Guide for Application of Power Apparatus Bushings	T. Spitzer	2012 12/2022	2019 12/2023	WG Draft Development

## Distribution Transformer Subcommittee Task force / Working Group Report

Document #: PC57.19.02

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

Chair: Steve Shull Vice-Chair: Ed Smith  
Secretary: Rhett Chrysler Percent Complete: 90

Current Draft Being Worked On: D2.1 Dated: March 2022

Meeting Date: March 29, 2022 Time: 11:00 am – 12:15 pm

### Attendance:

NAME	Affiliation	M or G
Alan Wilks	Consultant	M
Albert Sanchez	Knoxville Utilities Board	G
Alex Alahmed	Evergy - Wolf Creek	G
Alex Doutrepepout	Siemens Energy	G
Ali Ghafoorian	H-J Enterprises, Inc.	M
Angela Leigi	EATON Corporation	G
Barry Beaster	H-J Family of Companies	M
Christopher Witten	Hitachi Energy	G
Clemens Reiss IV	Custom Materials, Inc.	M
Craig DeRouen	ERMCO	M
Daniel Posados	Prolec SA de CV	G
Daniel Sauer	EATON Corporation	M
Darren Brown	Howard Industries	M
Gary King	Howard Industries	G
Hugo Flores	Hitachi Energy	M
James Spaulding	Fort Collins Utilities	M
Jared Bates	Oncor Electric Delivery	G
Jeffrey Door	H-J Family of Companies	G
Jennie Aldenlid	Hitachi Energy	G
Jonathan Deverick	Dominion Energy	G
Jose Gamba	H-J Family of Companies	M
Joshua Verdell	ERMCO	M
Kendrick Hamilton	Power Partners, Inc.	M
Kyle Heiden	EATON Corporation	M

NAME	Affiliation	M or G
Lee Matthews	Howard Industries	G
Marek Kornowski	Polycast International	M
Michael Dahlke	Central Moloney, Inc.	M
Michael Hardin	H-J Enterprises, Inc.	M
Michael Morgan	Duke Energy	M
Mubarak Abbas	Siemens Energy	G
James Spaulding	Fort Collins Utilities	M
Stephen Shull	BBC Electrical Services, Inc.	CHR
Pam Edwards	Art Advertising, Inc.	G
Paminder Panesar	Virginia Transformer Corp.	G*
Ramadan Issack	American Electric Power	M
Reinaldo Valentin	Duke Energy	M
Rhett Chrysler	ERMCO	SEC
Rich Frye	Eaton	G
Robert Reepe	Georgia Power Co.	M*
Scott Digby	Duke Energy	G
Shelby Walters	Howard Industries	M
Som Sanjib	Pennsylvania Transformers	G
Stefan Schindler	Maschinenfabrik Reinhausen	G
Timothy Tillery	Howard Industries	M
Troy Tanaka	Burns & McDonnell	G
Weijun Li	Braintree Electric Light Dept.	M



## Distribution Transformer Subcommittee Working Group Report

### Meeting Minutes:

The chair called the meeting to order at 11:00 am.

Attendance is included in table above

- 47 total
- 25 members
- 22 guests
  - \*2 guests requested membership; requests were rejected due document being in ballot status

Quorum was not established, 25/59 (42%) members participating.

The chair presented the agenda. The agenda could not be approved by the working group since quorum was not established.

The chair presented the minutes from the Fall 2022 meeting. The minutes could not be approved by the working group since quorum was not established.

The chair presented the IEEE SA slides for Essential Patent Claims.

The chair provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or the holder of patent claim(s)/patent application claim(s) of which the participant is personally aware and that may be essential for the use of that standard. None were identified.

The chair presented the IEEE SA Copyright Policy.

### Old Business

Review status of the Ballot

- The Ballot is still in process and closes on April 02, 2022
- To date, 278 comments have been formally submitted, additional comments were submitted via an attached file resulting in 290 comments to date
  - 218 editorial
  - 15 general
  - 57 technical
- Of the 290 submitted comments, 225 were marked as much be satisfied

### New Business

Comment Resolution Group

The chair asked for 4 volunteers to form a ballot comment resolution group. Steve Shull, Rhett Chrysler, Barry Beaster, and James Spaulding volunteered to be members of the comment resolution group.

The chair will submit an email ballot to ask the working group members to give the comment resolution group the permission and authority to provide final resolution of all comments so that the working group can proceed to a recirculation ballot as soon as the group's work is completed. Any comments that the comment resolution group cannot address with a consensus will be brought back to the working group for resolution.

Barry Beaster expounded on his ballot comments regarding max current interrupt ratings to the working group by referencing IEC 60137 100 kA requirements vs. IEEE C57.12.00 63 kA (Distribution) and 80 kA (Power) requirements.

The chair clarified that any suggested additions that are not resolved via the comment resolution group would be considered for the next PAR cycle.

No other new business was brought forward.

Meeting was adjourned at 11:30 am.

Next meeting is scheduled for the Fall 2022 Transformer Committee meeting in Charlotte, NC.

Submitted by: Rhett Chrysler

Date: 03/29/2022

## **IEC/IEEE 65700\_19\_03 DC Bushings WG**

Minutes of 2022 Spring Meeting

Tuesday, March 29<sup>th</sup>, 2022- 4:45 – 6:00 PM  
Hyatt Regency – Denver, CO – Centennial D-E

Eric Weatherbee – Chair

Vacant – Vice Chair

J. Arturo Del Rio – Secretary

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**Acting WG Meeting Chair: J. Arturo Del Rio**

The WG met on Tuesday, March 29<sup>th</sup>, 2022 at 4:45 pm., with 8 participants.

### **1. Welcoming and Call for Patents, Copyrights**

- The meeting was called to order at 4:45 PM by the Chair.
- The call for potentially essential patents and copyrights issues was made. None were reported.

### **2. Quorum**

- 4 Members of the 10 WG Members were present therefore quorum was not met. Agenda and previous meeting minutes could not be approved.
- 3 active participants of the Joint Team (JMT) were attending the meeting
- The Chair requested participation from utility and user representatives

### **3. Update on Join Team activity**

The first joint meetings (JMT) were held by teleconference on February 15 and 16, 2022, from 1:00pm to 3:00 pm (Central European Time).

**3.1.** Established three Task Forces (TF) to address subjects, requiring expertise in the respective area.

- a.** TF1 to review and suggest updates in case Voltage Source Converters (VSC) are included in the standard.
- b.** TF2 to review and suggest updates to the altitude corrections and pollution parameters.
- c.** TF3 to review and suggest updates to the special tests section, regarding even and uneven wetting.

**3.2.** Sections and parts of the document were highlighted red, yellow, or green according to importance, accordingly:

- a. Review and propose updates to Category Green, referring to the compilation of comments and setting up the structure for a Committee Draft (CD).
- b. Review and propose updates to the complete section 6 in IEC/IEEE 65700-19-03 since the purpose is unclear.
- c. A review of the yellow-marked sections in the compilation of comments started and comments from the delegates.

#### **4. New business:**

##### **4.1 How to proceed with section 6 General requirements?**

This part seems to be a legacy from an older IEEE DC bushing version and is not 100% aligned with C57.19.00.

In all new standards like C57.19.01 (see below) or C57.19.03 the part of General requirements is only referencing to the main standard

##### **3. General requirements**

Refer to IEEE Std C57.19.00 for general requirements, definitions, and methods of measurements or tests applying to detailed requirements given in [Clause 4](#).

It was mentioned the necessity of updating or deleting this section in the next revision of the standard. The question was the IEEE view on that?

In other joint standards a reference to both standard families were included. So, we can handle it in a similar way and reference to IEEE C57.19.00 and to IEC 60137 (Chapter 6: Ordering information and markings - which is more detailed).

Alternatively, an update to the existing C57.19.00 or IEC 60137 could be proposed.

**4.2** Meetings for other Joint standard development held the working group meeting partly as in person before or after IEEE Fall / Spring meetings, which brought an efficient collaboration. We can propose an in person Joint Team WG meeting before or after the Fall 2022 meeting in Charlotte.

**4.3** Nameplate markings for OIL type bushings should state PCB contents.

Meeting was adjourned at 5:15pm

#### **Next JMT JOINT Meeting**

To be held by Zoom teleconference service on two consecutive days.

Tuesday 31st of May 2022 from 13:00 to 15:00 (Central European Time).  
 Wednesday 1st of June 2022 from 13:00 to 15:00 (Central European Time).

### Next WG Meeting

F22 - Charlotte, NC. October 16<sup>th</sup> – 20<sup>th</sup>, 2022

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

### Attendance and status:

Last name	Name	Affiliation	Status
Cruz Valdes	Juan Carlos	Prolec GE	Member
Sen	Cihangir (John)	Duke Energy	Guest
Pointer	Klaus	Trench Austria	Guest
Kaineder	Kurt	Siemens Energy	Member
Euvar	Eric	RHM International	Guest
Gazivoda	Dora	Konkar Inst. Transf.	Guest
Radbrandt	Ulf	Hitachi Energy	Member
Del Rio	Art	Siemens Energy	Secretary

## C57.19.100 Unapproved Minutes Spring 2022, Denver Co.

We met on Monday March 28 at 3:15 PM. I called the meeting to order and did a roll call which resulted in having 5 members present so we did not have a quorum to proceed. Durand Stacy has agreed and gotten permission to serve as Secretary but was unable to be at this meeting. We had a total attendance of 30 with 5 members and 25 guests.

I had sent draft 3 out before the meeting but due to the attendance I will resend it and ask for an email vote on our progress. We had an open discussion about composite bushings and Art Del Rio, Johnathan Deverick, Alexander Doutrelepoint, Eric Euvar, and Dominic Pollaro volunteered to send me information to be included in Draft 4.

## Attendance:

Mubarack Abbas – Siemens Energy - Guest  
Barry Beaster - H-J Family of Companies – Guest  
Randy Branneb – Southern Company - Guest  
Samson Debass – EPRI – Guest  
Juan Carlos Cruz Valdes – Prolec GE - Guest  
Art Del Rio – Siemens Energy – Member  
Johnathan Deverck – Dominion Energy – Guest  
Scott Digby – Duke Energy – Member  
Huen Dihn – Hitachi Energy - Guest  
Larry Dix – Quality Switch – Guest  
Paul Dolloff – East Kentucky Power – Guest  
Jeffery Door – H-J Family of Companies - Guest  
Alex Doutrelepoint – Siemens Energy - Guest  
Kurt Kaineder – Siemens Energy – Guest  
Egon Kirchenmayer – Siemens Energy – Member  
Chao Li – Eaton - Guest  
Mavek Kornoloski – Polycast – Guest  
Tom Matsen – Xcel Energy - Guest  
Robert Middleton – RHM International – Member  
Tihomir Pandza – Siemens Energy – Guest  
Goran Plisic – Siemens Eneergy - Guest  
Dominic Polarro – NASS – Guest  
Daniel Posadas – Prolec - Guest  
Clemens Reiss IV – Custom Materials – Guest  
Seremi Sewell – Quality Switch – Guest  
Russ Sewell – Quality Switch - Guest  
Tommy Spitzer – City Transformer – Chair  
Troy Tanaka – Burns & McDonald – Guest  
Malia Zaman – IEEE - Guest

We adjourned at 3:45

Tommy Spitzer P.E.

Chair

April 10, 2022



## SPRING 2022 MEETING OF IEEE TRANSFORMER BUSHINGS

**Location: DENVER**

**Date: March 27-31, 2022**

### BUSHINGS SUBCOMMITTEE WORKING GROUP AND TASK FORCE MEETINGS

**Liaison Reports - IEC Bushing Standardization Activities**

#### INTERNATIONAL ELECTROTECHNICAL COMMISSION

#### TECHNICAL COMMITTEE No.36A: Insulated Bushing

<b>SC 36A Bushing dimensional standardization</b>	<p>A draft report has been finalized summarizing the possible standardization of LV (&lt; 1 kV) , MV (1 to 52 kV) and HV (72.5 to 500 kV) transformer bushings.</p> <p>It is covering OIP, RIP and RIS technology.</p> <p>A Preliminary Work Item (PWI 36A-1) has been opened: monthly meetings are planned in 2022 to issue a technical report.</p> <p>The document will be split in two parts: LV and MV, HV.</p>
<b>Guide of application for power apparatus bushings</b>	<p>A Preliminary Work Item (PWI 36A-2) has been opened.</p> <p>Meetings are on going.</p>
<b>Maintenance Team for revision of IEC 62199 Bushings for DC application</b>	<p>Revision of the standard IEC 62199 ed 1 on a dual logo procedure with IEC/IEEE, with a particular attention to keep the cross references to other IEC documents.</p> <p>The establishment of the JMT 9 DLMT (HVDC Bushings) in collaboration with IEEE has been approved, eight experts have been nominated by their NC.</p> <p>Mr Lars Jonsson (SE) has been approved as the convenor.</p>
<b>Maintenance Team for revision of IEC 60137 Bushings above 1kV.</b>	<p>Revision of the standard IEC 60137 with review of the contents and extension of tables to cover the new UHV voltage classes according to IEC60071-1</p> <p>Workplan to be defined</p>

### IEEE 693 Liaison Report

- IEEE Std 693™, IEEE Recommended Practice for Seismic Design of Substations.
  - Current version published 2018.
  - Amendment PAR was granted in 2020 to modify time-history and require dynamic modeling of the transformer and the specific bushing to be used.
- F21 Technical Presentation was given by Jon Bender. The amendment did not address replacement bushings.



1

### IEEE Std 693™

- Durand Stacy and Jon Bender established some additional modeling analysis that will be done to determine the impact of varying stiffness on the transformer system.
- Coupled with weight change restrictions and moment demands determined during the modeling, this may allow for some bushing replacement options that fall within specific ranges. This did take considerable effort by WG to include in the document.



2

### Area of Concern

- The 2018 WG voted against the dynamic modeling requirement.
- Some issues discussed in 2018 WG:
  - Lack of a modeling guide for consistency
  - Model verification, difficulties that may arise if the model was found not to match the actual transformer system.
- The current amendment does not require a modeling guide nor model verification.



3

### Area of Concern (cont.)

- Discussions during the WG meeting has included the lack of transformer features in some models that would impact the results as well as the modeling methodology used.
  - A modeling guide may help with consistency
- Lack of a model verification requirement
  - Currently model verification is included as informative only. Suggesting it can be done to improve the techniques of modeling the transformer system but is not a requirement



4

### Areas of Concern (cont.)

- Lack of model verification (cont.)
  - Without verification how can it be known if this is an improvement or detriment vs 2018 version.
  - Can a future failure analysis be completed if the transformer system does not perform as expected.
  - The verification process could be considered as an informational data for improving future models and not for acceptance or qualification criteria.



5

### Areas of Concern (cont.)

- Lack of model verification (cont.)
  - A minimum verification of the bushing installed frequency is suggested to take 10 min. Specific instruction on how to perform this test can be included in the Guide.
  - The verification requirement of the model can be eliminated in future revision if deemed appropriate.



6

### 693 Amendment

- Current timeline is to seek 2/3 majority vote of the WG this May and then proceed to requesting Substation Subcommittee approval to go to ballot.
- Could use more diversity as far as additional Transformer/Bushing OEMS and End Users
- Contact the WG Chair or Secretary
  - Michael Riley [miriley@bpa.gov](mailto:miriley@bpa.gov)
  - Brian Low [brian.low@pge.com](mailto:brian.low@pge.com)



7



## ANNEX B

### IEEE PES TRANSFORMERS COMMITTEE

#### DIELECTRIC TEST SUBCOMMITTEE

Meeting held on Wednesday, March 30, 2022 at the Hyatt Regency (Centennial E), Denver, Colorado, USA

Dielectric Tests Subcommittee		
<b>Chair: Poorvi Patel</b>	<b>Vice-Chair: Thang Hochanh</b>	<b>Secretary: Diego Robalino</b>
Room: Centennial E	Date: March 30 <sup>th</sup> , 2022	Time: 11:00 am to 12:15 pm
Total DTSC Members: 157	Members present at the meeting: 71	Attendance according AMS: N/A
Guests present: 133	Membership requested: 12	Membership accepted:10

#### B.1 Chair's Remarks

The Chair welcomed members and guests to the Spring 2022 in-person meeting. The new Chair Dr. Poorvi Patel, briefly introduced the new DTSC Secretary Dr. Diego Robalino, and informed attendees that the session will be recorded just to later prepare the minutes. The recording is to be deleted afterward.

Poorvi requested Ajith Varghese to stand up. The new DTSC Chair expressed her gratitude to Ajith for the last 5 years serving as DTSC Chair and followed by the applause of all attendees.

The agenda was presented before any count was made of members attending this meeting. It was emphasized the need of having the minutes of each TF and WG submitted to the DTSC Secretary no later than 15 (fifteen) days after the meeting. It was also reminded that any presentation made during the meeting should be posted on the website.

During this meeting no AMS system was available. Secretary distributed 4 sets of printed roasters for attendees to sign in attendance.

##### a. ADCOM highlights

- There will be a mandatory training for existing officers to be launched June 1<sup>st</sup>. Deadline is December 31<sup>st</sup>.
- AMS system under discussion and being replaced. The goal is to have it ready for the fall meeting.
- A new document 'participation behavior policy' underworks. Malia to provide it and probably, it will be part of the registration process.

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
C57.160	Guide for the Elec. Measurement of PD in HV bushings and Instrument Transformers	2020 _ In comment resolution since 2019. Expected completion by 12/22	PAR 2022
C57.113	Recommended practice for PD Measurement Power	2020	PAR 2023
C57.98	Guide for transformer Impulse Tests	2021 – Need to see if PAR extension is needed	PAR 2022
C57.138	Recommended Practice for Routine Impulse Tests for Distribution Transformers	2026	Need PAR and WG
C57.161	Guide for DFR Measurements	2028	WG Inactive
C57.168	Low Frequency Test Guide	NEW	PAR 2022
C57.12.200	Bushing Dielectric Frequency Response Guide (ENTITY WG)	NEW. Should be completed by 12/22	PAR 2022

Next Chair reminded the NesCOM/RevCom meeting dates and deadlines for 2022 standard submissions. If PAR extension is needed the last date for that next year is **13 October 2022**

Standard Board Meeting	Submittal Deadlines
Apr 27, 2022	May 06, 2022
Oct 25, 2022	Aug 11, 2022

Chair reminded the requirements to become a DTSC Member:

Two attendance requirements:

1. Attend 2 out of last three DTSC meetings
2. Attend 3 out of last five DTSC meetings

New requests for membership

1. Contact chair or secretary directly
2. Request will be approved if you meet attendance requirements

From last meeting, two participants requested membership, One was approved: Alain Bollinger. The group welcomed the new member.

To date, total active Members of the DTSC are 157 and 79 should be present in order to achieve quorum.

## **B.2 Quorum, Approval of Minutes and Agenda**

To verify quorum the list of 157 members is displayed. Chair indicated that because the last three meetings were in virtual environment, there has not much been done cleaning the members list, but now going back to in-person meetings, the list will be revised for the next meeting.

Members' headcount was 71 (seventy one). Quorum was not reached. Agenda not approved / neither minutes from last meeting.

### **Attendance Summary**

	Webex
Total Attendees	204
Total # Of Members	157
Members Present	71
Quorum Present	no (45%)

## **B.3 SC Discussions and Motion passed.**

Old Business:

- PD in Bushing during factory induced testing of transformers- Survey was performed for adding the below text in C57.12.90 Section 10.8.5
  - 87% Approved and 13% Rejected
  - Survey to go back to the TF to review the comments and address the comments
  - Review of statement by the specific TF

- **Establish Limits Core to Ground Insulation Resistance :**
  - Does SC see a need to come up with a limit ?
  - If so need a TF , a motion to establish – This was approved and a new TF is created
- **Frame to ground Insulation Resistance :**
  - Is it performance requirement to include in standards
  - Does SC see a need to review this topic further ? - This topic to be discussed
  - This item is part of the TF scope. More details to be discussed with the TF members

#### **B.4 Taskforce and Working Group Reports**

Reports are in the order presented during the meeting

**B.4.1 Task Force Winding Insulation Power Factor & Winding Insulation Resistance Limits,  
Diego Robalino (Chair) and Aniruddha Narawane (Secretary) at the meeting**

**Minutes of 1<sup>st</sup> Meeting held on 03/29/2022 from 8.00 am MST to 9.15 am MST**

**In person Meeting: CENTENIAL H meeting hall, Hyatt Regency, Colorado Convention Center,  
Denver**

1. Meeting was called to order at 8.00 am with a welcome by Chairman Diego Robalino.
2. As this was the first meeting for the TF, Secretary explained to the attendees that anybody wishes to be a member can become a member of the TF.
3. Chairman checked for any patents and copy rights and there were none.
4. As this was the first meeting there was no quorum check. There were 60 attendees and 27 requesting Membership.

**5. Attendance**

	WebEx
Total Attendees	58
Total # Of Members Requested	30
Members Present	32
Quorum Present	First meeting N/A

- 6.
7. Chairman presented the general agenda, Scope of the task force and requested to have a discussion on the Scope.
8. There were discussions and some suggestions for additions to scope like - considering the IR values for: Core to Ground & Core Clamps to Ground, Special designs, construction of core and Coil for various types of designs, inclusion of series Auto and PA with main transformer. Categorization of IR values for Field and Factory tests. Analyzing Polarization Index, Usage of Digital v/s Analog instrument for testing.
9. Chairman shared his opinion of starting the TF scope with more general points and the TF work progresses more specific points can be discussed and if agreed can be worked on. There was consensus on this view.
10. There was also discussion about considering Oil, Ester and Dry type transformers. Chairman explained that the TF does not specifically mention oil immersed transformers. He also mentioned that it is very important to receive the data from attendees to consider all these types of transformers. One attendee mentioned that this TF is tied to dielectric sub committee and as such DI-Electric Subcommittee covers all types of transformers.
11. One attendee asked what the goal of the TF is, and chair explained that as directed by Di-electric subcommittee, the goal is to develop best practices only.
12. Chairman and Secretary mentioned that all the attendees will be contacted via email with relevant details to request the data. Data collection procedure will be same as that followed during the previous work of TF -Winding Insulation PF-IR Limits.

13. With no further discussions on scope, purpose and goal, Chairman thanked all the attendees and meeting adjourned at 9.00am MST.

14. Attendee List

Sr. No.	Last Name	First Name	Email	Column1	Column2	Column3	Member(M)/Guest (G)
1	Adams	Kayland	<a href="mailto:Kayland.Adams@prolec.energy">Kayland.Adams@prolec.energy</a>				M
2	Almeida	Nabi	<a href="mailto:nabi.almeida@prolecge.com">nabi.almeida@prolecge.com</a>				M
3	Ansari	Tauhid	<a href="mailto:tauhid.ansari@hitachienergy.co">tauhid.ansari@hitachienergy.co</a>				M
4	Antosz	Stephen	<a href="mailto:santosz@ieee.org">santosz@ieee.org</a>				M
5	Artega	Javier	<a href="mailto:javier.artega@hitachienergy.co">javier.artega@hitachienergy.co</a>				M
6	Avanoma	Onome	<a href="mailto:o.avanoma@outlook.com">o.avanoma@outlook.com</a>				M
7	Ayers	Don	<a href="mailto:donald.ayers@ieee.org">donald.ayers@ieee.org</a>				M
8	Beggie	Kevin	<a href="mailto:kevin.beggie@weidmann-group.com">kevin.beggie@weidmann-group.com</a>				G
9	Benzler	Olle	<a href="mailto:olle.benzler@megger.com">olle.benzler@megger.com</a>				G
10	Boettger	William	<a href="mailto:WEBOETTGER@aol.com">WEBOETTGER@aol.com</a>				M
11	Byrnes	Ryan	<a href="mailto:rbyrnes@hicoamerica.com">rbyrnes@hicoamerica.com</a>				G
12	Calitz	David	<a href="mailto:david.calitz@siemens-energy.com">david.calitz@siemens-energy.com</a>				M
13	Carrizales	Alfredo	<a href="mailto:juanalfredo.carrizales@prolecge.com">juanalfredo.carrizales@prolecge.com</a>				G
14	Castellanos	Juan	<a href="mailto:juangonzalo.castellanos@prolecge.com">juangonzalo.castellanos@prolecge.com</a>				M
15	Dillon	Nikolaus	<a href="mailto:nikolaus.dillon@dominionenergy.com">nikolaus.dillon@dominionenergy.com</a>				G
16	Dolloff	Paul	<a href="mailto:PAUL.DOLLOFF@ekpc.coop">PAUL.DOLLOFF@ekpc.coop</a>				G
17	Elliott	William	<a href="mailto:will.elliott@alumni.lsu.edu">will.elliott@alumni.lsu.edu</a>				G
18	Flores	Hugo	<a href="mailto:hugo.flores@hitachienergy.com">hugo.flores@hitachienergy.com</a>				M
19	Gara	Loren	<a href="mailto:lgara@shermco.com">lgara@shermco.com</a>				M
20	Garza	Hector	<a href="mailto:hector.garza@orto.mx">hector.garza@orto.mx</a>				G
21	Griesaker	B	<a href="mailto:bgriesacker@verizon.net">bgriesacker@verizon.net</a>				G
22	Havens Spiller	Bridget	<a href="mailto:Bhavens@Ameren.com">Bhavens@Ameren.com</a>				G
23	Herron	John	<a href="mailto:herronjph@aol.com">herronjph@aol.com</a>				G
24	Hogg	Ryan	<a href="mailto:rhogg@ieee.org">rhogg@ieee.org</a>				G
25	Hollrah	Derek	<a href="mailto:dhollrah@burnsmcd.com">dhollrah@burnsmcd.com</a>				M
26	Kiparizoski	Zan	<a href="mailto:ZKIPARIZOSKI@HOWARD.COM">ZKIPARIZOSKI@HOWARD.COM</a>				M
27	Levin	Aleksandr	<a href="mailto:aleksandr.levin@weidmann-group.com">aleksandr.levin@weidmann-group.com</a>				G
28	Mahajan	Kushal	<a href="mailto:kushalmahajan@eaton.com">kushalmahajan@eaton.com</a>				M
29	Mani	Balkrishana n	<a href="mailto:Balkrishnan_Mani@vatransformer.com">Balkrishnan_Mani@vatransformer.com</a>				M
30	Martinez	Rogelio	<a href="mailto:ROGELIO.MARTINEZ@gatransformer.com">ROGELIO.MARTINEZ@gatransformer.com</a>				G
31	Mbouombou o	Mama	<a href="mailto:mama.mbouombouo@hitachienergy.com">mama.mbouombouo@hitachienergy.com</a>				M
32	Munoz	Martin	<a href="mailto:martin.munoz@orto.mx">martin.munoz@orto.mx</a>				G

33	Nesudd	Brody	<a href="mailto:broddy.a.nesudd@xcelenergy.com">broddy.a.nesudd@xcelenergy.com</a>	G
34	Panesar	Parminder	<a href="mailto:parminder_panesar@vatransformer.com">parminder_panesar@vatransformer.com</a>	M
35	Patel	Poorvi	<a href="mailto:ppatel@epri.com">ppatel@epri.com</a>	M
36	Pepe	Harry	<a href="mailto:hpepe@doble.com">hpepe@doble.com</a>	G
37	Pollard	Dominic	<a href="mailto:dpollard@nassusa.com">dpollard@nassusa.com</a>	G
38	Riggins	Benjamin	<a href="mailto:Benjamin.D.Riggins@xcelenergy.com">Benjamin.D.Riggins@xcelenergy.com</a>	G
39	Sauer	Dan	<a href="mailto:dmsauer@eaton.co">dmsauer@eaton.co</a>	M
40	Schappel	Steven	<a href="mailto:Steven.Schappel@prolecge.com">Steven.Schappel@prolecge.com</a>	G
41	Schrammel	Alfons	<a href="mailto:alfons.schrammel@siemens-energey.com">alfons.schrammel@siemens-energey.com</a>	G
42	Sen	Cihangir	<a href="mailto:cihangir.sen@duke-energy.com">cihangir.sen@duke-energy.com</a>	M
43	Shalabi	Jaber	<a href="mailto:jshalabi@vantran.co">jshalabi@vantran.co</a>	M
44	Shannon	Michael	<a href="mailto:MSHANNON@REAWIRE.COM">MSHANNON@REAWIRE.COM</a>	G
45	Shosanya	Adetokunbo	<a href="mailto:toksjiidesho@yahoo.com">toksjiidesho@yahoo.com</a>	M
46	Simons	Andre	<a href="mailto:andre.simons@jfeshojipower.com">andre.simons@jfeshojipower.com</a>	G
47	Som	Sanjib	<a href="mailto:ssom@patransformer.com">ssom@patransformer.com</a>	M
48	Steineman	Andy	<a href="mailto:asteineman@deltastar.com">asteineman@deltastar.com</a>	G
49	Swan	Phil	<a href="mailto:phil.swan@resapower.com">phil.swan@resapower.com</a>	G
50	Taylor	Marc	<a href="mailto:mark.taylor@jfeshojipower.com">mark.taylor@jfeshojipower.com</a>	M
51	Tolcachir	Eduardo	<a href="mailto:ETOLCACHIR@TTE.COM.AR">ETOLCACHIR@TTE.COM.AR</a>	M
52	Varghese	Ajith	<a href="mailto:Ajith.Varghese@prolec.energy">Ajith.Varghese@prolec.energy</a>	M
53	Wallach	David	<a href="mailto:david.wallach@duke-energy.com">david.wallach@duke-energy.com</a>	M
54	Wazir	Areeb	<a href="mailto:areebawazir@eaton.com">areebawazir@eaton.com</a>	M
55	Weiss	Zachery	<a href="mailto:zweiss@weg.net">zweiss@weg.net</a>	M
56	ynui	Andrea	<a href="mailto:andrea.ynui@siemens-energy.com">andrea.ynui@siemens-energy.com</a>	G
57	Robalino	Diego	<a href="mailto:diego_robalino@ieee.org">diego_robalino@ieee.org</a>	Chair
58	Narawane	Aniruddha	<a href="mailto:Aniruddha Narawane">Aniruddha Narawane</a> <a href="mailto:&lt;anarawane@ieee.org&gt;">&lt;anarawane@ieee.org&gt;</a>	Secretary

#### **B.4.2 TF on Revision of Low-Frequency Tests**

**Chair: Bill Griesacker, Vice Chair: Daniel Blaydon (acting secretary), Secretary: Myron Bell (not present). Denver, Colorado Meeting – March 29, 2022 1:45-3:30pm MDT**

- 1. The meeting was called to order at 1:45 PM.**
2. A quorum was achieved with 26 of 52 total members present. Three individuals requested membership by email and were given member status based on attendance and participation.
- 3. A motion was made by Dan Sauer (Eaton Corporation) and Akash Joshi (Black & Veatch) to approve the agenda and Fall 2021 meeting minutes. There were no objections to unanimous approval of the agenda and meeting minutes.**
4. The chair stated that this would be his last meeting chairing the TF, due to the committee rotation preference to limit position terms to 5 years. The new Chair will be Ajith Varghese (GE Prolec SPX).
- 5. Task Force on PD Testing of Class 1 Power Transformers – Don Ayers**

**B.5 The proposed procedure and limits from the task force was surveyed to the members and guests of the RLFT Task Force. The survey results and comments were reviewed. The survey obtained 47 total votes, with an 78.7 % approval ratings. It was noted that the survey was conducted at the same time that the new C57.12.00 and C57.12.90 standards were published, and therefore, there was a need to update the proposal in the survey based on new versions of 12.00 and 12.90. In the new proposal, Class I PD limits will not be reduced down to new limits for Class II transformers. The comments received from the survey were reviewed. Don Ayers will address these comments in the TF and will send out an updated version of the survey.**

#### **6. Factory PD Limits and Procedure Survey Results**

The proposed changes from the Study Group on the factory PD procedure and limits were surveyed. The survey obtained 84 total votes, with an 88.1% approval rating. The comments received from the survey were reviewed. Some minor revisions will be made to the proposal and the TF will proceed to move the proposal toward voting. Comments related to maximum system voltage in Table 4 and test levels will be worked into the proposal.



## 7. PD in Bushings During Factory Testing

The TF on PD in Bushings During Transformer Factory Testing will be reconvened to address the comments received from the survey.

## 8. Old business

No old business.

## 9. New business

Unresolved comments from the balloting of C57.12.00 and C57.12.90 were reviewed. These will need to be addressed separately at upcoming TF meetings.

## 10. The meeting was adjourned at 2:55 p.m.

### Attendance

Role	First Name	Last Name	Company
Guest	Javier	Arteaga	Hitachi ABB Power Grids
Member	Donald	Ayers	Ayers Transformer Consulting
Guest	Barry	Beaster	H-J Family of Companies
Vice-Chair	Daniel	Blaydon	Baltimore Gas & Electric
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	Josh	Bohrn	Siemens Energy
Guest	Alain	Bolliger	HV TECHNOLOGIES, Inc.
Member	Jeffrey	Britton	Phenix Technologies, Inc.
Member	David	Calitz	Siemens Energy
Guest	Arup	Chakraborty	Delta Star Inc.
Guest	Nikolaus	Dillon	Dominion Energy
Guest	Evgenii	Ermakov	Hitachi Energy
Guest	Marco	Espindola	Hitachi ABB Power Grids
Member	Reto	Fausch	RF Solutions

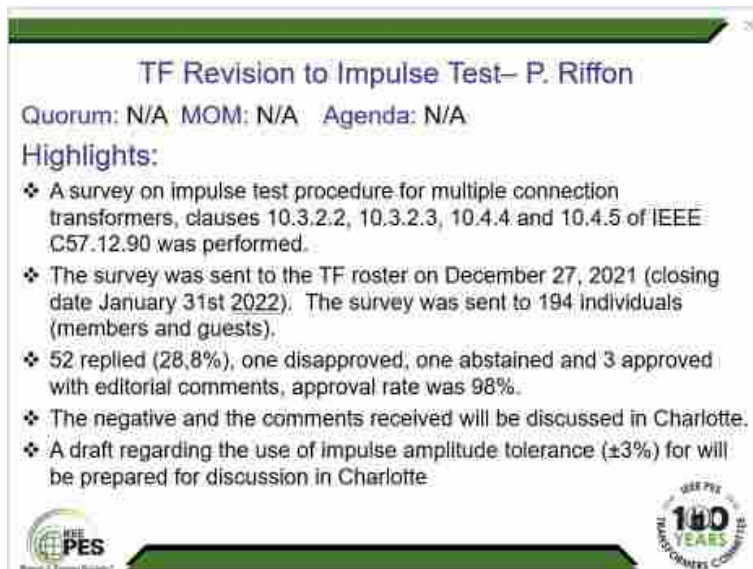
Guest	Rich	Frye	Eaton
Chair	Bill	Griesacker	Duquesne Light Co.
Member	Shamaun	Hakim	WEG Transformers USA Inc.
Guest	Kyle	Heiden	EATON Corporation
Member	Sergio	Hernandez Cano	Hammond Power Solutions
Member	John	Herron	Raytech USA
Member	Philip	Hopkinson	HVOLT Inc.
Member	Stephen	Jordan	Tennessee Valley Authority
Member	Akash	Joshi	Black & Veatch
Guest	John	Kotula	Dominion Energy
Guest	Axel	Kraemer	Maschinenfabrik Reinhausen
Guest	Alexander	Kraetge	Omicron
Member	Mark	Lachman	Doble Engineering Co.
Member	Weijun	Li	Braintree Electric Light Dept.
Guest	Rogelio	Martinez	Georgia Transformer
Guest	Thomas	Melle	HIGHVOLT
Guest	Rhea	Montpool	Schneider Electric
Member	David	Murray	Tennessee Valley Authority
Guest	Brady	Nesvold	Xcel Energy
Guest	Poorvi	Patel	Electric Power Research Institute (EPRI)
Member	Harry	Pepe	Phenix Technologies, Inc.
Guest	Daniel	Posadad	Prolec SA DE CV
Guest	Ulf	Radbrandt	Hitachi ABB Power Grids
Member	Marnie	Roussell	Entergy
Member	Daniel	Sauer	EATON Corporation

Guest	Steven	Schappell	SPX Transformer Solutions, Inc.
Member	Steven	Snyder	Hitachi ABB Power Grids
Member	Sanjib	Som	Pennsylvania Transformer
Member	Mike	Spurlock	Spurlock Engineering Services, LLC
Guest	Brad	Staley	Salt River Project
Member	Kyle	Stechschulte	American Electric Power
Guest	Andrew	Steineman	Delta Star Inc.
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Guest	Jason	Varnell	Doble Engineering Co.
Guest	Pragnesh	Vyas	Sunbelt-Solomon Solutions
Guest	Alan	Washburn	Burns & McDonnell
Guest	Zachery	Weiss	WEG Transformers USA Inc.
Member	Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden
Guest	Jeffrey	Wright	Duquesne Light Co.
Member	Kris	Zibert	Allgeier, Martin and Associates

## B.5.1 Task Force for Impulse Guide – PC57.98

TF Chair: Pierre Riffon

- TF – Revision to Impulse Tests (P. Riffon)
- No meeting carried out but he sent some highlights to DTSC Chair
  - Survey on Impulse Test procedures
    - 57 approved, 1 rejected, therefore survey carried
    - Editorials 98%, the negative will be discussed next time in Charlotte



The screenshot shows a presentation slide with a green header bar. The title is 'TF Revision to Impulse Test– P. Riffon'. Below the title, it says 'Quorum: N/A MOM: N/A Agenda: N/A'. The section 'Highlights:' is followed by five bullet points. At the bottom left is the IEEE PES logo, and at the bottom right is a circular logo for '100 YEARS' of the IEEE PES TRANSDUCERS COMMITTEE.

**TF Revision to Impulse Test– P. Riffon**

Quorum: N/A MOM: N/A Agenda: N/A

**Highlights:**

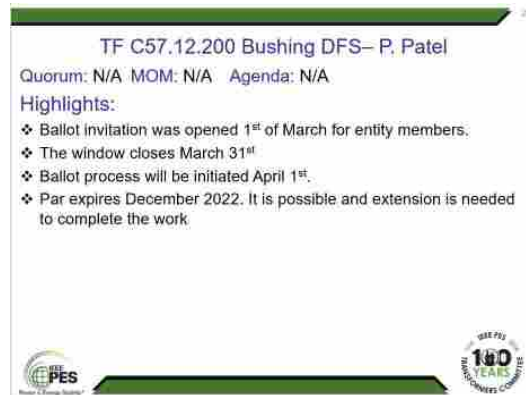
- ❖ A survey on impulse test procedure for multiple connection transformers, clauses 10.3.2.2, 10.3.2.3, 10.4.4 and 10.4.5 of IEEE C57.12.90 was performed.
- ❖ The survey was sent to the TF roster on December 27, 2021 (closing date January 31st 2022). The survey was sent to 194 individuals (members and guests).
- ❖ 52 replied (28.8%), one disapproved, one abstained and 3 approved with editorial comments, approval rate was 98%.
- ❖ The negative and the comments received will be discussed in Charlotte.
- ❖ A draft regarding the use of impulse amplitude tolerance ( $\pm 3\%$ ) for will be prepared for discussion in Charlotte.

IEEE PES  
Power & Energy Society

100 YEARS  
IEEE PES  
TRANSDUCERS COMMITTEE

**B.5.2 Task Force for Bushing DFR – PC57.12.200,; TF Chair: Poorvi Patel; TF Vice Chair: Charles Sweetser, TF Secretary: Diego Robalino**

- Document sent to ballot – approved by DTSC via e-mail
- Entity Members are the only ones able to vote during the ballot process
- PAR expires before December 2022. Possible extension needed. But meetings will be planned in between.



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

<b>Chair:</b>	<b>Hakan Sahin</b>	<b>Vice-Chair</b>	<b>N/A</b>
<b>Secretary</b>	<b>David Wallace</b>	<b>Percent Complete</b>	<b>N/A</b>

<b>Current Draft Being Worked On:</b>	<b>Draft not started</b>	<b>Dated:</b>	<b>n/a</b>
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<b>PAR Expiration Date:</b>	<b>PAR not started</b>
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<b>Meeting Date:</b>	<b>29 March 2022</b>	<b>Time:</b>	<b>3:15pm MDT</b>
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<b>Location:</b>	<b>Denver, CO, USA</b>
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<b>Attendance:</b>	<b>Members</b>	<b>Par Study Group. All attendees considered members</b>
		<b>20</b>
	<b>Guests</b>	
	<b>Guests Requesting Membership</b>	<b>To be granted to those attended and requested – 10 requested</b>
	<b>Total*</b>	<b>20</b>

\* Attendance list for this meeting is shown at end of meeting minutes

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## **Meeting Minutes / Significant Issues / Comments:**

Meeting was called to order at 3:15pm MDT, March 29, 2022.

### **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. Informed the group on the PAR study group and the membership status to be granted when the PAR is approved
  - ii. As this was PAR study group, all attended were considered members for the Spring-22 meeting
- f. Approval of Agenda
  - i. Anonymously approved with no objections
- g. Approval of minutes
  - i. No previous meeting minutes as this WG was inactive

## 2. New Business

- a. Currently C57.138 is inactive. The document expires in 2026. The Spring-22 meeting was conducted as a group study that relies on majority of agreements.
- b. All attended reviewed the title, scope and purpose, and discussed if any of them may need to be changed. Group also discussed if the document should be reviewed and updated as it expires.
- c. There were total of 20 attendees in the meeting. The PAR study group (TF) reviewed the title, scope, purpose and 18 attendees agreed to the following motion to be presented during the Dielectric Test Subcommittee meeting, 2 abstain with no objections.

### Motion

Create a PAR project type: Revision to Standard C57.138-2016

**Project Title:** IEEE Recommended Practice for Routine Impulse Tests for Distribution Transformers

### Change to Scope:

This recommended practice covers routine impulse tests performed on distribution transformers, as required in IEEE Std C57.12.00™, and described in 10.4 of IEEE Std C57.12.90™-2015-2021<sup>1</sup>. Distribution transformers covered by this recommended practice are ~~liquid-immersed, single- and three-phase overhead type up to 500 kVA; single-phase pad-mounted compartmental type and underground type up to 167 kVA; three-phase pad-mounted compartmental type; and underground type up to 2500 kVA.~~ overhead, pad-mounted, and underground liquid-immersed distribution transformers with requirements specified in IEEE Std C57.12.20, IEEE Std C57.12.23, IEEE Std C57.12.24, IEEE Std C57.12.34, IEEE Std C57.12.36, IEEE Std C57.12.38 and IEEE Std C57.12.40. This recommended practice covers only those aspects of impulse testing that are specific to routine testing of distribution transformers. For more thorough coverage of impulse testing of transformers in general, IEEE Std C57.98™ should be consulted.

### Change to purpose:

This recommended practice assists manufacturers of distribution transformers in the setup and ~~operation of performing a routine impulse test~~ and assists distribution transformer users and purchasers in understanding the routine impulse test and how it differs from design tests.

**Need for the project:**

Review and update the document as it expires on 12/31/2026.

3. Next meeting: TBD at Fall 2022 Transformer Committee Meeting scheduled for October 16-20, 2022 in Charlotte, NC, USA.
4. Close of meeting
  - a. Meeting adjourned at 4:30pm MDT

Submitted by: Hakan Sahin Date: 4/19/22

**3/28/2022 Meeting Attendance:**

Last Name	First Name	Company (Affiliation)	Requesting Membership
Winter	Alexandar	Highvolt	Yes
Hernandez	Giovannie	Virginia Transformers	
Alonso	Mario	Georgia Transformers	
Murray	David	TVA	
Shalabi	Jaber	Vantran	Yes
Frye	Rich	Eaton	Yes
Wallace	David	Mississippi State University	Yes
Bolliger	Alain	HV Technologies	Yes
Sahin	Hakan	Virginia and Georgia Transformer	Yes
CruzValdes	Juan Carlos	Prolec GE	Yes
Wimberty	Barret	GE	
Carr	Deniss	GE	
Davis	Eric	Burns and McDonald	
Fausch	Reto	RF Solutions	Yes
Elliott	William	Prolec GE	
Flores	Hugo	Hitachi	



Last Name	First Name	Company (Affiliation)	Requesting Membership
Prince	Jarrold	ERMCO	
Diaz	Cesar	Eaton	Yes
Patel	Poorvi	EPRI	Yes
Dolloff	Paul	EKPC	

TF C57.138– TF Chair: Hakan Sahin



Quorum: N/A Agenda: TF is inactive. Review the existing title, scope, purpose and decision on a PAR to review and update the document as it expires in 2026

Highlights:

- ❖ 20 attended. Reviewed the title, scope, purpose and majority agreed to the following motion

**Motion** (to be voted on at the SC-meeting)  
Create a PAR project type: Revision to Standard C57.138-2016

**Project Title:** IEEE Recommended Practice for Routine Impulse Tests for Distribution Transformers

*Motion was made to create a PAR for starting C57.138 WG. The guide expires in December 2026.*

*Motion could not be voted on as the DTSC did not have Quorum. This motion will be sent to all the DTSC members to vote on by email.*

- **Task Force Transient Failure Mitigation (WG PC57.142), WG to Investigate the Interaction between Substation Transients and Transformers in HV and EHV Applications and Revision of C57.142**

Denver, CO

Tuesday, March 29<sup>th</sup>, 2022

3:15 PM – 4:30 PM Mountain Time Zone - USA

**Chairman – Jim McBride**

**Vice Chair – Xose Lopez-Fernandez**

**Secretary – Tom Melle**

- 1) Meeting called to order at 3:15 PM Central Time.  
Welcome and Chair's Remarks
- 2) 53 Attendees were present (32 Guests) 21 of 49 Members present  
Quorum was not achieved.
- 3) IEEE Patent Policy Slides and Copyrights slides (NO essential patent claims or copyright issues)
- 4) Approval of Agenda and Minutes from Last Meeting.  
Quorum was not achieved. Therefore, the Minutes will be sent by e-mail for approval.
- 5) SA Ballot– Jim McBride

C57.142 Draft 10 is now under ballot. Only the slight editorial changes and mandatory changes requested by MEC were made between Draft 10 and the Draft 9B which was approved by the WG.

6) Switchgear Liaison Update

No new business from the Switchgear group. The Spring Switchgear Committee meeting will be held in Orlando, FL from April 10<sup>th</sup> – 14<sup>th</sup> 2022. We will encourage voting on the ballot at the meeting.

The WG focus now will be on Mitigation Methods until balloting begins.

7) Mitigation Methods Task Force Update – Jim McBride / Phil Hopkinson

The membership of task force was shown. Several of the suggested mitigation methods follow:

- Resistor-Capacitor Snubbers
- Increasing Insulation in Key Areas with Additional Test Requirement for Special Terminated Lightning Impulse to Better Test for Field Conditions.
- Using Shielding to increase Series Capacitance and reduce capacitance to ground in order to Improve Impulse Distribution and Reduce Series Resonance
- Introduce Internal Surge Protection to Limit Over-voltages During Resonant Conditions
- Reignition Mitigation with Controlled Switching
- Using Resistance Load During Switching to Provide Damping During the Event

- Online Monitoring to Identify Actual Field Interactions and Identify Real World Conditions at the Transformer Terminals and Within the Transformer.
- 8) Presentation: *Mitigation of internal over-voltages with MOV's* - Juliano Montanha, Egon Kirchenmayer. The presentation will be available on the working group website.

Following the presentation several questions were fielded by Mr. Kirchenmayer and the Chair regarding ZnO varistors in practical use by manufacturers and about preliminary quality checks and testing of MOV's. There is an IEC standard for surge arrester testing used as a reference for MOV test procedures. The chair also discussed the effect of temperature on losses.

- 9) Preview of Presentation: Mitigation of Failure using online monitoring – Jim McBride (to be presented next meeting)

The Chair provided a brief summary about the mitigation methods discussed in previous meetings.

- 10) New Business – During the Fall 2021 (virtual) meeting, Deepak Kumaria suggested the possibility of including the study of transients on instrument transformers in the WG. This topic will be investigated during the next meeting.
- 11) Next Meeting - Fall 2022 – Charlotte, NC USA (TBD) October 16<sup>th</sup> – 20<sup>th</sup>, 2022
- 12) Motion to Adjournment made by the Chair at 4:30 PM with no objection.

#### Meeting Attendance List

Role	Last Name	First Name	Company	City	State	Present 3/29/22	Rqst Mmbrs hp
Chair	McBride	James	JMX High Voltage	Fayetteville	GA	X	
Sec.	Melle	Thomas	HIGHVOLT	Holly Springs	NC	X	
Member	Betancourt	Enrique	Prolec GE	Apodaca	Other	X	
Member	Boettger	William	Boettger Transformer Consulting LLC	Danville	CA	X	
Member	Britton	Jeffrey	Phenix Technologies, Inc.	Accident	MD	X	
Member	Dinh	Huan	Hitachi Energy	Lexington	KY	X	
Member	Garcia Wild	Eduardo	Siemens Energy	Guanajuato	Other	X	
Member	Heiden	Kyle	EATON Corporation	Milwaukee	WI	X	
Member	Hopkinson	Philip	HVOLT Inc.	Charlotte	NC	X	

Member	Joshi	Akash	Black & Veatch	Cary	NC	X	
Member	Kirchenmayer	Egon	Siemens Energy	Nuremberg	Other	X	
Member	Li	Weijun	Braintree Electric Light Dept.	Braintree	MA	X	
Member	Pepe	Harry	Phenix Technologies, Inc.	Accident	MD	X	
Member	Pointner	Klaus	Trench Austria GmbH	Leonding	Other	X	
Member	Radbrandt	Ulf	Hitachi Energy	Ludvika	Other	X	
Member	Roussell	Marnie	Entergy	New Orleans	LA	X	
Member	Sarkar	Amitabh	Virginia Transformer Corp.	Roanoke	VA	X	
Member	Sharp	Michael	Trench Limited	Scarborough	ON	X	
Member	Sizemore	Thomas	ABB Inc.	Greenville	NC	X	
Member	Snyder	Steven	Hitachi Energy	Versailles	KY	X	
Member	Spurlock	Mike	Spurlock Engineering Services	Columbus	OH	X	

X

Guest	Ayers	Donald	Ayers Transformer Consulting	Waxhaw	NC	X	
Guest	Craven	Michael	Phoenix Engineering Services	Atlanta	GA	X	
Guest	Gamboa	Jose	H-J Family of Companies	High Ridge	MO	X	
Guest	Harley	John	FirstPower Group LLC	Peninsula	OH	X	X
Guest	Jordan	Stephen	Tennessee Valley Authority	Chattanooga	TN	X	
Guest	Leigl	Angela	EATON Corporation	Waukesha	WI	X	X
Guest	Parkinson	Dwight	EATON Corporation	Waukesha	WI	X	
Guest	Patel	Nitesh	Hyundai Power Transformers USA	Montgomery	AL	X	X
Guest	Roman	Zoltan	GE Grid Solutions	Charleroi	PA	X	
Guest	Sanchez	Albert	Knoxville Utilities Board	Knoxville	TN	X	
Guest	teNyenhuis	Ed	Hitachi Energy	Stoney Creek	ON	X	
Guest	Varghese	Ajith	SPX Transformer Solutions, Inc.	Hartland	WI	X	X
Guest	vonGemmingen	Richard	Dominion Energy	Mechanicsville	VA	X	
Guest	Zaman	Malia	IEEE	Piscataway	NJ	X	
Guest	Ziger	Igor	KONCAR - Instrument Transformers	Zagreb	Other	X	
Guest	Rocque	Tim	Prolec GE Waukesha	Waukesha	WI	X	
Guest	Posadas	Daniel	Prolec SA de CV	Mty, NL, MX	Other	X	

Guest	Oliveira	Jonas	Hitachi Energy	Crystal Springs	MS	X	
Guest	Al Ahmed	Alex	Eergy Wolf Creek	Kansas City	MO	X	
Guest	Pandza	Tihomir	Siemens Energy	Zagreb	Other	X	
Guest	Gaziloda	Dora	KONCAR - Instrument Transformers	Zagreb	Other	X	
Guest	Kotuna	John	Dominion Energy	Richmond	VA	X	
Guest	Plisic	Goran	Siemens Energy	Zagreb	Other	X	
Guest	Dillon	Nikolaus	Dominion Energy	Richmond	VA	X	
Guest	Dolloff	Paul	East Kentucky Power	Winchester	KY	X	
Guest	Door	Jeffrey	H-J Family of Companies	Hill Ridge	MO	X	
Guest	Shosanya	Adetokunbo	XCEL Energy	Amarillo	TX	X	
Guest	Avanoma	Onome	MJC	Winnipeg	Canada	X	X
Guest	Salmon	Tommy	GE Grid Solutions	Chesterfield	VA	X	
Guest	Deverick	Jonathan	Dominion Energy	Richmond	VA	X	
Guest	Zhery	Rigi	HICO	Memphis	TN	X	
Guest	Debass	Samson	EPRI	Charlotte	NC	X	X

- Next Meeting:  
Fall 2022 – Charlotte, NC October 18<sup>th</sup>, 2022.

We will be discussing mitigation methods for failures associated with instrument transformers.

- The meeting was Adjourned at 4:30pm.

- **WG – Low Frequency Test Guide PC57.168**

## **Unapproved Meeting Minutes**

**DENVER, COLORADO, USA | March 29<sup>th</sup>, 2022 | 9:30 – 10:45 AM CDT**

**Chair:** Dan Sauer  
**Vice Chair:** -  
**Secretary:** Sergio Hernández

### **Meeting Attendance**

The working group met at 9:30am. There were 34 attendees and 11/27 members present. Quorum was not achieved.

Attendance	
	Rosters
Total Attendees	34
Total # of members	27
Members present	11
Quorum present	41%

### **Discussions**

- No essential patent claims noted.
- The IEEE copyright policy was shown; no objections were noted.
- The chair introduces to the working group the new secretary, Sergio Hernández.
- The agenda of the Spring 2021 meeting still unapproved as no quorum was achieved at the meeting.

### **Old Business**

- The draft 4 of PC57.168 was circulated back in February 2022 by email to members and guests to vote on its suitability to proceed to sponsor ballot. There were no enough responses. Chair remains the attendants that members have the responsibility to attend to the meetings and to respond by email.
- Several comments were received at the time the draft was circulated by email, those were shared and discussed during the meeting:
  - Section 6.6 – Effect of core inter-laminar resistance on measured power factor
    - Group agreed to modify the term scratching by scribing.
    - It was recommended to add some ohmic resistance values to interlamination resistance. The group agreed this is a QA matter of the transformer's manufacturer and no need to include into the guide.
    - Comment received that the material focuses on stacked core form transformers but the issue also applies to some shell form transformers. Chair will review with the person who issued the comments to clarify.

- Group asks if the figure 17, Dissipation factor relative to core lamination resistance, is supported by actual data. Chair will review with person who submitted the graph.
- Section 6.2 & 6.3. The comments are related to upcoming updates to a future revision of the c57.12.90. The group agrees to not modify the draft.
- Section 5, induced testing with continuous monitoring. The group asks if this is a common practice in the industry. Chair will review with person who submitted the section.
- Figure 1- Alternate induced test circuit used in lieu of applied voltage test for two-winding transformers with delta-wye connected transformers. The group requests to add the standard test circuit to the guide. The chair will add to the draft.
- Several editorial comments were received, will be addressed in the draft.

### **New Business**

- A new attempt to get members and guests to vote on the draft suitability to proceed to sponsor ballot will be done by email in the following weeks.
- An extension to the PAR will be requested by the chair, if necessary.

### **Adjournment**

- No quorum to adjourn the meeting.

Meeting concluded at 10:16 am

Sergio Hernández

Attendee List:

First Name	Last Name	Company
Onome	Ananoma	MJ Consulting
Barry	Beaster	H-J Family of Companies
Wallace	Binder	WBBinder Consultant
William	Boettger	Boettger Transformer Consulting LLC
Alain	Bolliger	HV TECHNOLOGIES, Inc.
Dominique	Bolliger, Ph.D.	HV TECHNOLOGIES, Inc.
David	Calitz	Siemens Energy
Juan Alfredo	Carrizales	Prolec GE
Eric	Davis	Burns & McDonnell
Samson	Debass	Epri
Marco	Espindola	Hitachi Energy
Lorne	Gara	Shermco
Eduardo	Garcia Wild	Siemens Energy
Giovani	Hernandez	Virginia Transformer Corp.
Sergio	Hernandez Cano	Hammond Power Solutions
Stephen	Jordan	Tennessee Valley Authority
Evan	Knapp	EATON Corporation
Mama	Mbduomboud	Hitachy Energy
Tom	Melle	Highvolt
Brady	Nesvold	Xcel Energy
Poorvi	Patel	EPRI
Harry	Pepe	Phenix Technologies, Inc.
Daniel	Posadas	Prolec SA de CV
Ulf	Radbrandt	
Tim	Rolque	Prolec GE Waukesha
Amitabh	Sarkar	Virginia Transformer Corp.
Daniel	Sauer	EATON Corporation
Avijit	Shingari	Pepco Holdings
Markus	Soeller	Power diagnostix systems
Mike	Spurlock	Spurlock Engineering Services, LLC
Janusz	Szczechowski	Maschinenfabrik Reinhausen
Alan	Traut	Howard Industries
Zachery	Weiss	WEG Transformers USA Inc.
Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden



### **B.5.3 WG C57.113 - Recommended Practice for PD Testing,**

#### **Unapproved Meeting Minutes**

**Denver March 27<sup>th</sup>, 2022**

**Chair:** Ali Naderian  
**Vice Chair/Secretary:** Janusz Szczechowski

#### **Meeting Attendance**

The working group met on Monday March 28<sup>th</sup> at 01:45 pm. There were 50 attendees, and 5 of 16 members present. Quorum was not achieved.

#### **Discussions**

- Meeting started with introduction of meetings participants with name and affiliation.
- Check of the quorum was done. Quorum was not reach. Past minutes of meeting and agenda could not be approved. Approval of the minutes of the meeting will be done over email.
- The essential patent slides were shown, and no patent claims were noted.
- The copyright policy and important links to additional document were shown.
- The chair explained again situation with vacant position for working group secretary and asked for volunteers.
- New draft of the standard was sent to the members. Members will be asked to put comments and send them over email.
- V-ce chair introduce new CIGRE brochure 861 "Improve to PD measurements for factory and site acceptance tests of power transformers". The full text will be presented on the next meeting after clarification of the CIGRE permission (copyright).

Janusz Szczechowski (01.04.2022)

*DTSC Chair made a comment about e-mails not received by active participants. It might be because we have old information not up to date. It was requested to communicate any update to DTSC Chair or Secretary.- move this to main section*

List of attendees

— Die Kunst —

148700-100777 1940-41 March 2<sup>nd</sup> 1942

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- **Working Group for Impulse Guide – PC57.98**

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

Work on going and on schedule probably no additional PAR extension is needed.

## **B.6 Liaison Reports**

### **IEEE High-Voltage Testing Techniques Subcommittee**

#### **Liaison Report to Dielectric Tests Subcommittee of IEEE Transformers Committee**

**Submitted by Jeff Britton (HVTT Subcommittee Chair)**

- **Liaison Report – HVTT (J. Britton)- Copy in the text from the slides**

HVTT has had no meeting

Safety guide – working on editorial. PAR expires end of the 2022 year

4.1 and 454 – working to finish

Looking at a TF to look into revisions for the main Std IEEE Std. 4.

Jim invited all interested in participating in these activities.

**B5. New Business**

No new business reported.

At this point attendance was verified one more time. Headcount did not change. Quorum was not reached.

**B6. List of Attendees to the DTSC meeting**

Role	First Name	Last Name	Company	3/30/2022
Guest	Kayland	Adams	SPX Transformer Solutions, Inc.	X
Member	Gregory	Anderson	GW Anderson & Associates, Inc.	X
Member	Tauhid Haque	Ansari	Hitachi Energy	X
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc	X
Member	Elise	Arnold	SGB	X
Member	Javier	Arteaga	Hitachi Energy	X
Member	Onome	Avanoma	MJ Consulting	X
Member	Donald	Ayers	Ayers Transformer Consulting	X
Guest	Gilles	Bargone	FISO Technologies Inc.	X
Guest	Barry	Beaster	H-J Family of Companies	X
Guest	Olle	Benzler	Megger	X
Guest	Jean-Noel	Berube	Rugged Monitoring Inc.	X
Member	Enrique	Betancourt	Prolec GE	X
Member	Daniel	Blaydon	Baltimore Gas & Electric	X
Member	William	Boettger	Boettger Transformer Consulting LLC	X
Guest	Alain	Bolliger	HV TECHNOLOGIES, Inc.	X
Member	Dominique	Bolliger, Ph.D.	HV TECHNOLOGIES, Inc.	X
Guest	Michael	Botti	Hyosung HICO	X
Guest	Jeremiah	Bradshaw	Bureau of Reclamation	X
Member	Jeffrey	Britton	Phenix Technologies, Inc.	X
Guest	Darren	Brown	Howard Industries	X
Member	David	Calitz	Siemens Energy	X
Guest	Juan Alfredo	Carrizales	Prolec GE	X
Member	Juan	Castellanos	Prolec GE	X
Member	Arup	Chakraborty	Delta Star Inc.	X
Guest	Solomon	Chiang	The Gund Company	X
Guest	Jaroslav	Chorzepa	ABB Inc.	X
Guest	Juan Carlos	Cruz Valdes	Prolec GE	X
Member	Eric	Davis	Burns & McDonnell	X
Guest	Pouneh	Davoudi	Delta Star Inc.	X

Guest	Sami	Debass	Electric Power Research Institute (EPRI)	X
Guest	Scott	Digby	Duke Energy	X
Member	Huan	Dinh	Hitachi Energy	X
Guest	Zachary	Draper	Delta-X Research Inc.	X
Member	Evgenii	Ermakov	Hitachi Energy	X
Guest	Marco	Espindola	Hitachi Energy	X
Member	Reto	Fausch	RF Solutions	X
Member	Hugo	Flores	Hitachi Energy	X
Member	Bruce	Forsyth	Bruce Forsyth and Associates PLLC	X
Member	George	Frimpong	Hitachi Energy	X
Guest	Jose	Gamboa	H-J Family of Companies	X
Member	Eduardo	Garcia Wild	Siemens Energy	X
Guest	Jeffrey	Gragert	Xcel Energy	X
Member	Bill	Griesacker	Duquesne Light Co.	X
Guest	Shamaun	Hakim	WEG Transformers USA Inc.	X
Member	John	Harley	FirstPower Group LLC	X
Guest	Bridget	Havens	Ameren	X
Member	Sergio	Hernandez Cano	Hammond Power Solutions	X
Member	John	Herron	Raytech USA	X
Guest	Gary	Hoffman	Advanced Power Technologies	X
Member	Saramma	Hoffman	PPL Electric Utilities	X
Guest	Ryan	Hogg	Bureau of Reclamation	X
Guest	Derek	Hollrah	Burns & McDonnell	X
Member	Philip	Hopkinson	HVOLT Inc.	X
Guest	Nicholas	Jensen	Delta Star Inc.	X
Member	Akash	Joshi	Black & Veatch	X
Guest	Zan	Kiparizoski	Howard Industries	X
Member	Egon	Kirchenmayer	Siemens Energy	X
Guest	Anton	Koshel	Delta Star Inc.	X
Member	Axel	Kraemer	Maschinenfabrik Reinhausen	X
Member	Alexander	Kraetge	OMICRON electronics Deutschland GmbH	X
Guest	Angela	Leigl	EATON Corporation	X
Member	Aleksandr	Levin	Weidmann Electrical Technology	X
Member	Weijun	Li	Braintree Electric Light Dept.	X
Member	Tim-Felix	Mai	Siemens Energy	X
Guest	Kumar	Mani	Duke Energy	X
Member	James	McBride	JMX Services, Inc.	X
Member	Thomas	Melle	HIGHVOLT	X
Member	Kent	Miller	T&R Electric Supply Co.	X
Guest	Rhea	Montpool	Schneider Electric	X
Member	Emilio	Morales-Cruz	Qualitrol Company LLC	X
Member	David	Murray	Tennessee Valley Authority	X
Guest	Ryan	Musgrove	Oklahoma Gas & Electric	X

Guest	Shankar	Nambi	Bechtel	X
Guest	Brady	Nesvold	Xcel Energy	X
Guest	Ashmita	Niroula	Ergon, Inc.	X
Member	Dwight	Parkinson	EATON Corporation	X
Chair	Poorvi	Patel	Electric Power Research Institute (EPRI)	X
Member	Nitesh	Patel	Hyundai Power Transformers USA	X
Member	Harry	Pepe	Phenix Technologies, Inc.	X
Member	Klaus	Pointner	Trench Austria GmbH	X
Member	Thomas	Prevost	Weidmann Electrical Technology	X
Member	Jarrold	Prince	ERMCO	X
Guest	Scott	Reed	MVA	X
Secretary	Diego	Robalino	Megger	X
Guest	Tim	Rocque	SPX Transformer Solutions, Inc.	X
Guest	Zoltan	Roman	GE Grid Solutions	X
Guest	Marnie	Roussell	Entergy	X
Member	Mickel	Saad	Hitachi Energy	X
Member	Hakan	Sahin	Virginia/Georgia Transformer	X
Guest	Dinesh	Sankarakurup	Duke Energy	X
Member	Manish	Saraf	Hammond Power Solutions	X
Member	Amitabh	Sarkar	Virginia Transformer Corp.	X
Guest	Steven	Schappell	SPX Transformer Solutions, Inc.	X
Member	Markus	Schiesl	SGB	X
Member	Jeffrey	Schneider	Power Partners/Spire Power Solutions	X
Guest	Alfons	Schrammel	Siemens Energy	X
Member	Ewald	Schweiger	Siemens Energy	X
Guest	Cihangir	Sen	Duke Energy	X
Guest	Stephen	Shull	BBC Electrical Services, Inc.	X
Member	Jonathan	Sinclair	PPL Electric Utilities	X
Guest	Thomas	Sizemore	ABB Inc.	X
Member	Steven	Snyder	Hitachi Energy	X
Guest	Markus	Soeller	Power Diagnostix	X
Member	Sanjib	Som	Pennsylvania Transformer	X
Member	Mike	Spurlock	Spurlock Engineering Services, LLC	X
Member	Brad	Staley	Salt River Project	X
Member	Kyle	Stechschulte	American Electric Power	X
Guest	Hampton	Steele	Tennessee Valley Authority	X
Member	Andrew	Steineman	Delta Star Inc.	X
Member	Charles	Sweetser	OMICRON electronics Corp USA	X
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen	X
Member	Troy	Tanaka	Burns & McDonnell	X
Guest	Marc	Taylor	JFE Shoji Power Canada Inc.	X
Guest	Ed	teNyenhuis	Hitachi Energy	X
Guest	Mark	Tostrud	Dynamic Ratings, Inc.	X



Member	Alwyn	Van Der Walt	Electrical Consultants, Inc.	X
Member	Ajith	Varghese	SPX Transformer Solutions, Inc.	X
Guest	Richard	vonGemmingen	Dominion Energy	X
Member	Pragnesh	Vyas	Sunbelt-Solomon Solutions	X
Member	David	Wallace	Mississippi State University	X
Member	David	Wallach	Duke Energy	X
Guest	Alan	Washburn	Burns & McDonnell	X
Guest	Joe	Watson	JD Watson and Associates Inc.	X
Guest	Zachery	Weiss	WEG Transformers USA Inc.	X
Member	Daniel	Weyer	Nebraska Public Power District	X
Member	Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden	X
Guest	Jeffrey	Wright	Duquesne Light Co.	X
Guest	Malia	Zaman	IEEE	X
Member	Kris	Zibert	Allgeier, Martin and Associates	X
Guest	Cesar	Diaz	EATON Corporation	X
Guest	Alex	Alahmed	Energy Wolf Creek	X
Guest	David	Burka	Xcel Energy	X
Guest	Benjamin	Rigging	Xcel Energy	X
Guest	Mama	Mbouombouo	Hitachi Energy	X
Guest	Robert	VanTool	Commonhealth Associates	X
Guest	Olivia	Cordova	Bureau of Reclamation	X
Guest	John	Kotua	Dominion Energy	X
Guest	Christopher	Whitten	Hitachi Energy	X
Guest	Jonas	Oliveira	Hitachi Energy	X
Guest	Kyle	Zemanovic	EATON Corporation	X
Guest	Rich	Fryc	EATON Corporation	X
Guest	Ryan	Byrnes	HICO America	X
Guest	Evan	Khapp	EATON Corporation	X

## **Annex C Distribution Subcommittee – Chair: Ed Smith**

**March 30, 2022  
Denver, Colorado**

**Chair: Ed Smith  
Vice-Chair: Jerry Murphy  
Secretary: Josh Verdell**

### **C.1 General Opening**

Josh opened the meeting welcoming everyone to the meeting. Josh informed the group that he would be covering for Ed during this meeting and that Tyler Morgan would be documenting the minutes. To establish a quorum, a list of members was displayed, and a quorum poll was made. We did have a quorum with 42 members in attendance by count of those identified on a slide presented in the meeting. Recorded attendance gave 104 in attendance and 48 members. List of attendees and affiliation attached below.

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

The Fall 2021 meeting minutes were reviewed, a motion was made to approve by Gary Hoffman, seconded by Al Traut, 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 28, 2022 at 11:00 a.m. with 68 in attendance.

1. Call to order  
The meeting was called to order by the Chair (Al Traut) at 11:00AM on Monday, March 28, 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. **30 of 49** 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 F21 minutes prior to the meeting for review. Minutes were approved without any opposition.

6. Chair Report

The Chair announced the active PAR expires in 2023. The plan is to complete the changes outlined here and vote to send the draft to ballot at the F22 meeting in Charlotte.

7. Old Business

- a. Discussion: LV Basic Insulation Levels
  - i. Al Traut states that we do not reference BIL level for low voltage ratings. Suggests modifying clause 5 adding a note to reference C57.12.00
  - ii. Steve Shull motions to accept change to the clause. Seconded by D. Mulkey. No opposition. Motion passes.
- b. Discussion: Adding "120" secondary rating to the standard
  - i. Multiple tables modified to include "120" as a secondary voltage
- c. Discussion: In Tables 2 and 3, change LV ratings "2400" to "2400/4160Y". Similar changes to other LV ratings  $\geq 2400V$ .
  - i. No objections to this change
- d. Discussion: Three phase angular Displacement and terminal arrangement
  - i. Al Traut suggests taking Table 4 and adding parenthetical information from Table 11. Modify Figure 4 to include angular displacement from Table 11. The current Table 11 would go away.
  - ii. Steve Shull motions to accept changes to these tables with the clarification that the notes should be informative and outside of the table. Seconded by Jerrod Prince. No opposition. Motion passes.
  - iii. Al Traut to incorporate the final changes into the next date.
- e. Discussion: Figure 1 and 2, Z Dimension
  - i. A. Traut questions the need for 125kV and 150kVBIL to be KVA dependent, but not 95kV rating. No one in attendance knows why the difference exists.
  - ii. Z dimension should be based upon bushings sizes that correlate to Tables 2, 3, and 6. Note will be modified in Figures 1 and 2.
- f. Discussion: LV Neutral Ground Schematic in Figure 6
  - i. M. Thibault suggests that showing the LV neutral connection on the drawing is only important if the connection is internal
  - ii. D. Mulkey suggests making the grounding schematic a dotted line which would designate it as optional.
  - iii. A. Traut suggests adding an informative "NOTE 2 – Bolted to case externally per 7.5.9" in Figure 6 similar to C57.12.70.
  - iv. We will include an arrow in Figure 6 that calls out NOTE 2.

8. New Business

No new business

9. Next meeting--date and location

The Next meeting will be the **2022 Fall: October 16 – 20, 2022**  
**Charlotte (Sheraton/Le Meridien), North Carolina, USA**

10. Adjournment

## The meeting was adjourned at 12:00 PM

Submitted by: Kendrick Hamilton

Date: 28/03/2022

### ATTENDANCE

	Role	First Name	Last Name	Company
1	Guest	Rehan	Ali	Siemens Energy
2	Guest	Nabi	Almeida	Prolec GE
3	Guest	Jared	Bates	Oncor Electric Delivery
4	Member	David	Blew	Retired (PSE&G)
5	Member	Darren	Brown	Howard Industries
6	Guest	David	Burke	Xcel Energy
7	Guest	Stuart	Chambers	Powertech Labs
8	Member	John	Chisholm	IFD Corporation
9	Member	Rhett	Chrysler	ERMCO
10	Member	Michael	Dahlke	Central Moloney, Inc.
11	Guest	Thomas	Dauzat	General Electric
12	Guest	Herton	de Oliveira Filho	Hitachi Energy
13	Member	Craig	DeRouen	ERMCO
14	Guest	Cesar	Diaz	EATON Corporation
15	Guest	Huan	Dinh	HitachiEnergy
16	Guest	Bob	Fyrer	DuPont
17	Guest	Hector	Garza	Orto de Mexico
18	Member	Carlos	Gaytan	Prolec GE
19	Member	Ali	Ghafourian	H-J Enterprises, Inc.
20	Guest	Orlando	Giraldo	H-J Family of Companies
21	Secretary	Kendrick	Hamilton	Power Partners, Inc.
22	Member	Kenneth	Hampton	Baltimore Gas & Electric
23	Guest	Kyle	Herden	EATON Corporation
24	Guest	John	Herron	
25	Guest	Zachary	Hutchinson	East Kentucky Power Coop
26	Member	Ramadan	Issack	American Electric Power
27	Guest	Karl	Jakob	Cargill, Inc.
28	Guest	Joe	Kelly	TCI Sales
29	Guest	Evan	Knapp	EATON Corporation
30	Guest	Andrew	Larison	Hitachi ABB Power Grids
31	Member	Angela	Leigl (Amador)	EATON Corporation
32	Guest	Lee	Matthews	Howard Industries
33	Guest	Kent	Miller	T&R Electric Supply Co.
34	Guest	Philip	Miller	Memphis Light, Gas & Water

35	Member	Michael	Morgan	Duke Energy
36	Guest	Daniel	Mulkey	Mulkey Engineering Inc.
37	Guest	Martin	Munoz Molina	Orto de Mexico
38	Guest	Jonas	Oliveira	Hitachi
39	Member	Dwight	Parkinson	EATON Corporation
40	Guest	Matt	Pmard	Weidmann Electrical Technology
41	Guest	Daniel	Posadas	Prolec GE
42	Member	Jarrod	Prince	ERMCO
43	Member	Robert	Reepe	Georgia Power Co.
44	Guest	Benjamin	Riggins	Xcel Energy
45	Member	Albert	Sanchez	Knoxville Utilities Board
46	Member	Jeffrey	Schneider	Power Partners
47	Guest	Michael	Shannon	Rea Magnet Wire
48	Member	Avijit	Shingari	Pepco Holdings Inc.
49	Guest	Adetokunbo	Shosanya	Xcel Energy
50	Member	Stephen	Shull	BBC Electrical Services, Inc.
51	Guest	Stefan	Siebert	BROCKHAUS MESSTECHNIK
52	Member	Audrey	Siebert-Timmer	IFD Corporation
53	Guest	Steve	Snyder	Hitachi
54	Guest	James	Spaulding	Fort Collins Utilities
55	Guest	Markus	Stank	Maschinenfabrik Reinhausen
56	Member	Liz	Sullivan	Dominion Energy
57	Member	Eric	Theisen	Metglas, Inc.
58	Member	Michael	Thibault	Pacific Gas & Electric
59	Guest	Timothy	Tillery	Howard Industries
60	Chair	Alan	Traut	Howard Industries
61	Member	Reinaldo	Valentin	Duke Energy
62	Guest	Robert	VanTol	Commonwealth Associates
63	Member	John	Vartanian	National Grid
64	Member	Joshua	Verdell	ERMCO
65	Guest	Shelby	Walters	Howard Industries
66	Member	Bruce	Webb	Knoxville Utilities Board
67	Member	Alan	Wilks	Consultant
68	Guest	Malia	Zaman	IEEE SA

**██████ 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 29, 2022 at 8:00 a.m. in with 48 in attendance.

- 1) Dan Mulkey called the meeting to order at 8:01 AM MST. Group introductions were made.
- 2) Opening remarks and announcements
  - a) AMS system has been discontinued. Paper rosters were circulated.
- 3) Dan Mulkey reviewed IEEE SA Copyright Policy and Essential Patent Claims. No issues were raised.
- 4) Membership changes were noted:
  - a) Added: Jane Hall, Robert Reepe, Michael Zarnowski
  - b) Changed to Guest: Cory Morgan, Robert Stinson, Matthew Enders, Glenn Anderson
- 5) Quorum was verified. The working group consisted of 58 members, requiring 29 for quorum. 30 members were counted at the start of the meeting. Attendance records later confirmed 29 members attended.
- 6) Dan Mulkey requested approval of the agenda. Paul Chisholm made a motion, second by Ken Hampton. Agenda was unanimously approved.
- 7) Dan Mulkey requested approval of the minutes. Tom Dauzat 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 Jul 15, 2014
    - i. Expires: 12/31/2024
    - ii. PAR expiration: 12/31/2024
    - iii. Status: in progress, draft 1.5
  - 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: in progress, draft 1.5
  - 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. There are two meetings left to finish C57.12.28 and C57.12.29.
  - b) Taskforce Report: Special Pad-mount Tests (pry-bar, wire probe)
    - i) Taskforce Members: Gary King, Shelby Walters, Michael Zarnowski.
    - ii) Dan Mulkey reviewed proposed wording so the standards now reference a generic spring scale rather than an Iron Man scale
    - iii) Tom Dauzat made a motion to accept proposed wording, second by Michael Zarnowski. Agenda was unanimously approved.

- c) Taskforce Report: Coating Adhesion Test Methods
  - i) Taskforce Members: Justin Minikel (chair), Jane Hall, Chris Guertin, Martin Bachand, Scott Abbott, Zoran Goncin.
  - ii) No progress has been made since last meeting. Taskforce to continue discussion and present proposed test plan to group at the Fall 2022 meeting.
- d) Taskforce Report: C57.12.38 Request on Tank Touch Temperatures
  - i) Taskforce Members: Jerry Murphy (chair), Steve Shull, Dan Mulkey, Jeremy Van Horn, Justin Minikel, Jane Hall, Chris Geuterin, Scott Abbott, Bruce Webb
  - ii) Bruce Web provided a taskforce update.
    - (1) The purpose of the taskforce was to develop a safety warning to call attention to potential burn risks for users who operate distribution transformers in public spaces.
    - (2) The following wording was proposed “Warning: users should take care when deploying pad-mounted transformers in publicly accessible locations as operational and environmental factors may cause the equipment’s exterior metal surfaces to reach excessive temperature which could result in burns to an individual who comes in contact with their surfaces”
    - (3) The warning was developed with C 57.12.00 and C57.12.38 and IEEE Editorial Style Manual in mind.
  - iii) Steve Shull made a motion to accept wording with the amendment to change “transformers” to “equipment” as an informative note. Motion was second by Josh Verdell.
  - iv) Group then discussed the following:
    - 1. Reviewed that the proposed wording is not a label but rather an informative note to provide user awareness of potential risks.
    - 2. History of this topic was reviewed. Initially this topic was brought up in C57.154 and has bounced around from different working groups before ending up here.
    - 3. A comment was made that further details on the work evaluating Tank Touch Temperatures is available on the website (including a review on OSHA and other applicable standards).
    - 4. A question was asked if this warning applies for transformers only over 65 rise. Discussed that warning would apply to all transformers as it is a design consideration for users.
    - 5. A comment was made that transformer paint color can be another mitigation method (i.e., white is better than green).
    - 6. A comment was made that enclosure standards are mainly directed at manufacturers (not necessarily end users)
    - 7. A question was raised on the legal implications of this warning.
 Group discussed that wording needs to be reviewed by editorial staff.
  - v) The working group voted. One member was opposed. The motion passed.
  - vi) Next action: Dan Mulkey to review wording with editorial staff and bring findings back to the group. Group to then discuss where in the two standards to incorporate this wording.
- e) Taskforce Report: Substrate Surface Preparation
  - i) Taskforce Members: Tom Dauzat (chair), Martin Bachand, Jane Hall and Zoran Goncin.
  - ii) Taskforce to draft up wording summarizing substrate preparation requirements that can be included in the annex.
  - iii) Dan Mulkey reviewed proposed draft wording to be included in Annex D outlining substrate surface preparation.

- iv) Tom Dauzat made a motion to included proposed wording in the standard. Second by Paul Chisholm. Motion was unanimously approved.
- f) C57.12.28 and C57.12.29 continued revision
  - i) Dan Mulkey reviewed 16 document changes proposed by Justin Minikel that consolidated changes recently approved in the revisions of C57.12.30 Standard for Pole-Mounted Equipment – Enclosure Integrity for Coastal Environments and C57.12.31 Standard for Pole Mounted Equipment – Enclosure Integrity. Details of changes are included in the meeting slides which are posted on the website.
    - (1) Proposed Change 1: Document structure change to match C57.12.30/31 2020 standards.
    - (2) Proposed Change 2: Addition of two clauses to align with C57.12.31 2020 standard.
    - (3) Proposed Change 3: Clarified coating system requirements wording.
    - (4) Proposed Change 4: Addition of clause in section 5 to align with test repetition called out in section 4.
    - (5) Proposed Change 5: Change enclosure color from Hunter to CIELab color space.
    - (6) Proposed Change 6: Clarified test specimens wording.
    - (7) Proposed Change 7: Simplified note wording on Figure 7 and 8.
    - (8) Proposed Change 8: Clarified adhesion test wording.
    - (9) Proposed Change 9: Clarified humidity test wording
    - (10) Proposed Change 10: Clarified impact test wording.
    - (11) Proposed Change 11: Clarified insulating fluids wording.
    - (12) Proposed Change 12: Clarified ultraviolet accelerated weathering test (QUV) wording.
    - (13) Proposed Change 13: Clarified simulated corrosive atmosphere breakdown (SCAB) test wording.
    - (14) Propose Change 14: Clarified abrasion resistance test wording.
    - (15) Propose Change 15: Clarified chipping resistance test wording.
    - (16) Propose Change 16: Clarified SCAB procedure.
  - ii) Paul Chisholm made a motion to accept all proposed changes. Second by Alan Wilks. Motion passed unanimously.
  - iii) Dan Mulkey reviewed additional minor changes to the draft
    - 1. Clarified Section 4 requirements: intended for all transformers not in coastal, not simply carbon steel transformers.
    - 2. Changed clause title: 5.1.1 Accessibility → 4.1.3 Exterior Surface
    - 3. Change clause title: 4.3 Resistance to foreign objects → Section 4.2.2 Test Methods
    - 4. Clarified wording in security test repetition.
    - 5. Reordered notes under coasting test panel drawings and clarified note wording.
  - iv) Steve Shull made a motion to accept minor changes. Seconded by Alan Wilks. Motion passed unanimously.
- 10) New business:
  - a) Jim Spaulding asked the group if 1-ph pad sills could be made out of a nonconductive material. Question was related to a transformer failure where a 1-ph, clam shell, pad mounted transformer was shifted on the pad and when the hood was lifted it arced to the conductor causing a significant event.
    - i) A comment was made an insulated cover could be added. Hold down clips is another option to anchor the transformer to the pad.

- ii) A question was asked if a nonconductive sill would pass the pry test. A comment was made that there are non-conductive sills that meet this requirement. However, generally they are used for corrosion resistance rather than nonconductive properties.
- b) Dan Mulkey asked the group if we should consider a temperature test to certify enclosure can with stand “X” temperature.
  - i) A comment was made that most nitrile gaskets are rated to 120C.
  - ii) Dan Mulkey asked the group if there were any manufactures doing heating tests. Tom Dauzat commented that he has run ran low frequency heating tests and saw gaskets starting to fail around 120 to 125°C.
  - iii) There was no motion to move this subject forward.
- 11) Next meeting: is planned for Oct 18, 2022 in Charlotte, NC USA
  - a) The following attendees requested membership and will be added to membership for the Spring 2021 meeting: Pugal Selvaraj, Vinay Patel
- 12) The meeting was adjourned at 9:13 AM MST.

Submitted by: Audrey Siebert-Timmer

Date: March 29, 2022

**List of Members:**

David Blew (Retired - PSE&G)  
Darren Brown (Howard Industries)  
John Chisholm (IFD Corporation)  
Michael Dahlke (Central Moloney, Inc.)  
Thomas Dauzat (General Electric)  
Ali Ghafourian (H-J Enterprises, Inc.)  
Ramadan Issack (American Electric Power)  
Gary King (Howard Industries)  
Brad Kittrell (Consolidated Edison Co. of NY)  
Brian Klaponski (Carte International Inc.)  
Andrew Larison (Hitachi Energy)  
Michael Morgan (Duke Energy)  
Daniel Mulkey (Mulkey Engineering Inc.)  
Dwight Parkinson (EATON Corporation)  
Robert Reepe (Georgia Power Co.)  
Jeffrey Schneider (Power Partners/Spire Power Solutions)  
Avijit Shingari (Pepco Holdings Inc.)  
Stephen Shull (BBC Electrical Services, Inc.)  
Audrey Siebert-Timmer (IFD)  
James Spaulding (Fort Collins Utilities)  
Liz Sullivan (Dominion Energy)  
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 Inc.)

**List of Guests:**



Herton De Oliveira Filho (PSE&G )  
 Craig Derouen (ERMCO)  
 Cesar Diaz (EATON Corporation)  
 Jeffrey Door (H-J Family of Companies)  
 Angela Leigl (EATON Corporation)  
 Tiffany Lucas, P.E. (SPX Transformer Solutions, Inc.)  
 Kent Miller (T&R Electric Supply Co.)  
 Vinay Patel (Consolidated Edison Co. of NY)  
 Jarrod Prince (ERMCO)  
 Albert Sanchez (Knoxville Utilities Board)  
 Dan Schwartz (Quality Switch, Inc.)  
 Pugal Selvaraj (Virginia Transformer Corp.)  
 Jeremy Sewell (Quality Switch, Inc.)  
 Russell Sewell (Quality Switch, Inc.)  
 Eric Theisen (Metglas, Inc.)  
 Timothy Tillery (Howard Industries)  
 Dan Tournous (Prolec GE)  
 Bruce Webb (Knoxville Utilities Board)  
 Kyle Zemanovic (EATON Corporation)

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

Rhett Chrysler, for Steve Shull, presented the following minutes from the working group meeting on March 28, 2022 at 3:15 p.m. with 61 in attendance.

1. The Chair called the meeting to order at 3:15 P.M. MST on March 28, 2022. Attendees identified themselves by name and affiliation verbally. A Poll was taken to identify WG members to which a quorum was established.
2. Agenda approval  
The Chair displayed the Agenda for this meeting. The Chair asked for any objections to the displayed Agenda. Hearing none, the Chair declared the Agenda approved as shown.
3. Minutes approval  
The Chair commented that the Meeting Minutes of the last meeting were posted on the Transformer Committee website. The Chair asked for any corrections to the Meeting Minutes as posted. Hearing none, the Chair declared the minutes approved as posted.
4. Confirmation of IEEE SA Essential Patent Statement  
The patent information request was displayed to the WG and 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.
5. 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 to the WG.
6. Old Business

The Chair presented a chart displaying the Ballot Group makeup. The Chair presented the Ballot results to the WG as per the following:

1. 92 editorial comments
2. 24 general comments
3. 12 technical comments
4. 53 of the above comments are marked “must be satisfied”

7. New Business

The Chair stated that the IEEE SA Standards Board Operations Manual Section 5.4.3 requires a Comment Resolution Group (CRG) to be created from WG members. The Chair stated that he would like to limit this CRG to four individuals composed of three WG member volunteers and himself. The Chair stressed to the WG that the three volunteers must be flexible and able to fully commit themselves to this CRG due to time restraints. The following WG members volunteered for the CRG:

1. Steve Shull
2. Dan Mulkey
3. Weijun Li
4. Rhett Chrysler

Brian Klaponski made a motion to accept “Dan Mulkey, Weijun Li, Rhett Chrysler, and Steve Shull as the CRG” and seconded by Avijit Shingari. The Chair asked for any opposition to the motion to which no opposition was recorded, therefore the motion was approved.

The Chair requested a final motion by the WG to “give the CRG the permission and authority to provide final resolution of all comments to proceed to a recirculation ballot with one exception being if the CRG can’t come to a consensus conclusion on one item then it will come back to the WG”. Paul Chisholm made a motion to the previous wording and seconded by David Blew. The Chair asked for any opposition to the motion to which no opposition was recorded, therefore the motion was approved.

There was no other new business.

8. The meeting adjourned at 3:40 P.M. MST.

Submitted by: Scott Dahlke.

Date: 3/29/2022

**Attendance:**

NAME	Affiliation	M or G
Kayland Adams	SPX Transformer Solutions, Inc	Guest
Cheryl Basel	WEG Transformers USA Inc.	Guest
Jared Bates	Oncor Electric Delivery	Guest
Kevin Biggie	Weidmann Electrical Technology	Guest
David Blew	Retired (PSE&G)	Member
David Burke	Xcel Energy	Guest
Paul Chisholm	IFD Corp.	Member
Rhett Chrysler	ERMCO	Member

Name	Affiliation	M or G
Brian Klaponski	Carte	Member
Andrew Larrison	Hitachi Energy	Guest
Weijun Li	Braintree Elec. Light Dept.	Member
Lee Matthews	Howard Industries	Guest
Kent Miller	T&R Electric Supply Co.	Guest
Rhea Montpool	Schneider Electric	Member
Michael Morgan	Duke Energy	Member
Dan Mulkey	Mulkey Engineering	Member

Name	Affiliation	M or G
James Spaulding	Fort Collins Utilities	Member
Liz Sullivan	Dominion Energy	Member
Eric Theisen	Metglas, Inc.	Member
Mike Thibault	Pacific Gas & Electric	Member
Tim Tillery	Howard Industries	Guest
Alan Traut	Howard Industries	Member
Reinaldo Valentin	Duke Energy	Member
John Vartanian	National Grid	Member

Michael S. Dahlke	Central Moloney, Inc.	Member
Thomas Dauzat	General Electric	Guest
Craig DeRouen	ERMCO	Member
Herton De Oliveira Filho	PSE&G	Guest
Jose Gamboa	H-J Family of Companies	Member
Hector Garza	Orto de Mexico	Guest
Carlos Gaytan	Prolec GE	Member
Ali Ghafourian	H-J Enterprises, Inc.	Member
Ken Hampton	BGE	Member
Michael Hardin	H-J Family of Companies	Member
Giovanni Hernandez	Virginia Transformer Corp.	Guest
Ramadan A Issack	American Electric Power	Member
Karl Jacob	Cargill-Power Systems	Guest
Gary King	Howard Industries	Member

Dwight Parkinson	Eaton	Member
Kevin Rapp	Cargill	Member
Robert Reepe	Georgia Power Co.	Member
Ben Riggins	Xcel Energy	Guest
Kevin Riordan	WEG Transformers USA Inc.	Guest
Albert Sanchez	Knoxville Utilities Board	Guest
Steve Schappell	SPX Transformers	Member
Stefan Schindler	Maschinenfabrik Reinhausen	Guest
Jefferey Schneider	Power Partners/Spire Power Solutions	Member
Jaber Shalabi	VanTran Industries, Inc.	Member
Michael Shannon	Rea Magnet Wire	Guest
Avijit Shingari	PEPCO Holdings	Member
Stephen Shull	BBC Electrical Services, Inc.	Member
Audrey Siebert-Timmer	IFD Corp.	Member

Josh Verdell	ERMCO	Guest
Pragnesh Vyas	Sunbelt-Solomon Solutions	Member
Shelby Walters	Howard Industries	Guest
Bruce Webb	Knoxville Utilities Board	Member
Zachery Weiss	WEG Transformers USA Inc.	Guest
Alan Wilks	<b>Consultant</b>	Member
Rahul Yadav	Dupont	Guest
Michael Zarnowski	Carte	Guest
Kyle Zemanovic	Eaton	Guest

### **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 28, 2022 at 1:45 p.m. with 42 in attendance.

#### **1. Call to order, Verification of Quorum, and Chair's remarks**

The meeting was called to order by the Chair, Ali Ghafourian, at 1:47 p.m. MST on Monday, March 28<sup>th</sup>, 2022, held at the Hyatt Regency Denver at Colorado Convention Center in room, Centennial H.

Quorum was established with 30 out of 59 Working Group members present by a show of hands counted and verified by paper rosters.

The Chair announced that a two-year PAR extension through the end of 2023 was requested and approved. The current Draft is ready for the Working Group to vote on to go to ballot based on all the corrections that were brought forth during the Fall 2021 Virtual Meeting. After the Draft review of the corrections made a vote will be taken which requires 2/3 majority of Members present (minimum of 20 voting Members' approval to pass).

#### **2. 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 slides, the Chair called for any Patents amongst the Working Group. No Patent claims were brought forth to the Chair.

**3. Approval of agenda**

The agenda (AGENDA C57.12.38 March 28-2022 Denver CO (R1).pdf) was issued to the Working Group prior to the meeting for review.

Stephen (Steve) Shull made the first Motion to approve the agenda.

Kenneth (Ken) Hampton seconded the Motion.

The Chair asked the Working Group members for the unanimous approval of the agenda and the agenda was unanimously approved.

**4. Approval of minutes of previous meeting**

The Fall 2021 Virtual meeting minutes (F21-C57.12.38-UnapprovedMinutesR1.pdf) were posted to the Distribution Subcommittee website after the meeting for the Working Group members to review.

Michael (Mike) Thibault made the first Motion to approve the Fall 2021 meeting minutes.

Avijit Shingari seconded the Motion.

The Chair asked the Working Group members for the unanimous approval of the Fall 2021 Virtual meeting minutes and the meeting minutes were unanimously approved.

**5. Draft review**

The latest draft, D2.6 (C57 12 38 D2.6 Mar 2022(Comments).pdf), was reviewed with the Working Group. This draft included all the changes brought forth during the Fall 2021 Virtual Meeting and had been posted to the Distribution Transformers Subcommittee website prior to this meeting for the Working Group to review. The main discussion during the meeting was over the newly added section to Annex A that covered Fault Indicators. Due to this section being incomplete based on recommendations from the Working Group the Task Force on Internal Components for Annex A lead by Craig DeRouen will provide updated content for this section before the Working Group votes to go to ballot. John Vartanian, Kenneth (Ken) Hampton, and Jeffrey (Jeff) Schneider volunteered to join the current members of this Task Force to assist in updating this section.

Stephen (Steve) Shull and Daniel (Dan) Mulkey suggested all changes within the current draft be fixed and then be submitted to MEC (Mandatory Editorial Coordination) for approval before the Working Group votes on the Draft to go to ballot. The Chair agreed, therefore before the Fall 2022 meeting the Working Group plans on completing all changes to the Draft, submit to MEC for approval, get 2/3 of the Work Group Members to approve the Draft to take to ballot, and seek approval from the Distribution Transformers Subcommittee to go to ballot prior to Fall 2022 Meeting in Charlotte.

**6. Old Business**

Bruce Webb reported (Update C57.12.38 TF Tank Touch Temperature.docx) for the Task Force on Tank Touch Temperature stating that a parallel Task Force within the Enclosure Integrity WG was formed to develop a "Safety Warning" that might be implemented within their Standard to address User concerns without requiring more formal Standard changes or additions. This proposed Safety Warning will be presented at the Enclosure Integrity meeting for consideration by their Working Group. This meeting be held at 8:00 a.m. MST Tuesday, March 29<sup>th</sup>, 2022, in Centennial D-E Rooms.

**7. New Business**

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

#### 8. Next meeting – Date and Location

The Chair announced the Working Group will meet at the Fall 2022 meeting in Charlotte, North Carolina (USA).

Dates: October 16<sup>th</sup> – 20<sup>th</sup>, 2022

#### 9. Adjournment

The Chair adjourned the meeting at approximately 2:28 p.m. MST.

Submitted by: Ali Ghafourian (Chair) and Jarrod Prince (Secretary)

Date: Thursday, March 29, 2022

#### **List of Attendees, Affiliations, Membership Status:**

\*\* 3 New Members were introduced to the Working Group. 1 of the 3 didn't attend this meeting.

\* A total of 3 guests requested Working Group membership which will be reviewed to determine who is eligible for membership before the Fall 2022 meeting.

1	John Chisholm	IFD Corporation	Member
2	Michael Dahlke	Central Moloney, Inc.	Member
3	Craig DeRouen	ERMCO	Member
4	Carlos Gaytan	PROLEC GE	Member
5	Ali Ghafourian (Chair)	H-J Enterprises, Inc.	Member
6	Kenneth Hampton	Baltimore Gas & Electric	Member
7	Ramadan Issack	American Electric Power	Member
8	Andrew Larison	Hitachi Energy	Member
9	Angela Leigl	EATON Corporation	Member
10	Kent Miller	T&R Electric Supply Co.	Member
11	Michael Morgan	Duke Energy	Member
12	Daniel Mulkey	Mulkey Engineering Inc	Member
13	Dwight Parkinson	EATON Corporation	Member
14	Jarrod Prince (Secretary)	ERMCO	Member
15	Robert Reepe**	Georgia Power Co.	Member
16	Jeffrey Schneider**	Power Partners	Member
17	Avijit Shingari	PEPCO Holdings Inc.	Member
18	Stephen Shull	BBC Electrical Services, Inc.	Member
19	Audrey Siebert-Timmer	IFD Corporation	Member
20	James Spaulding	Fort Collins Utilities	Member
21	Markus Stank	Maschinenfabrik Reinhausen	Member
22	Eric Theisen	Metglass, Inc.	Member
23	Michael Thibault	Pacific Gas & Electric	Member
24	Reinaldo Valentin	Duke Energy	Member
25	John Vartanian	National Grid	Member
26	Joshua Verdell	ERMCO	Member
27	Pragnesh Vyas	Sunbelt-Solomon Solutions	Member
28	Shelby Walters	Howard Industries	Member
29	Bruce Webb	Knoxville Utilities Board	Member
30	Alan Wilks	Consultant	Member
31	Jared Bates*	Oncor Electric Delivery	Guest
32	Rhett Chrysler	ERMCO	Guest

33	Anthony Coker	M&I Materials	Guest
34	Thomas Dauzat	PROLEC GE	Guest
35	Herton DeOliveira Filho	PSE&G	Guest
36	Cgsar Diaz	EATON Corporation	Guest
37	Hector Garza	Orto de Mexico	Guest
38	Martin Munoz Molina	Orto de Mexico	Guest
39	Daniel Posadas	PROLEC S.A. DE C.V.	Guest
40	Albert Sanchez*	Knoxville Utilities Board	Guest
41	Stefan Schindler	Maschinenfabrik Reinhausen	Guest
42	Liz Sullivan*	Dominion Energy	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 28, 2022 at 9:30 a.m. There were 77 in attendance for this meeting.

1. Welcome - Phil Hopkinson welcomed the members and noted his longevity with IEEE Transformers as his first meeting was in 1972. It was noted that with the changes at IEEE web storage/access, agendas now will need to be sent to the IEEE TC website for posting for member pre-meeting access.
2. Roster  
77 were in attendance. Attendance list below.
3. Essential Patent Statement
4. Quorum Verification
5. Approval of Agenda – Agenda approved as submitted.
6. Approval of the Minutes of the Last Meeting – Spring 2021, Virtual  
Minutes were approved as submitted.
7. Technical Topics
  - a. Phil Hopkinson introduction for the Tutorial
  - b. Review of the Tutorial for Thursday, March 31----both sessions. With speakers:
    - i. Dan Mulkey on current loading
    - ii. Steven Rosenstock on future forecast for loading
    - iii. Kevin Rapp on liquids for higher thermal capacity
    - iv. Tom Prevost on solid materials for higher thermal capacity
    - v. Casey Ballard on non-Kraft paper materials for higher thermal capacity
    - vi. Al Traut for Distribution Transformer designs for Dual kVA Nameplate

c. Dan Mulkey on Loading

Dan Mulkey shared above presentation on data submitted (Dominion, Duke, Toronto Hydro, Knoxville). Mr. Mulkey noted that now with use of smart meters, we can have 15 minute and hourly data usage from the smart meter. So the question is, what time interval do we want to get best estimate of the transformer loading?  
Reviewed years of hourly data from 2014 at his house that was downloaded from PG&E. Added solar in 2016 so he showed how one can see load fluctuation up and down with the solar addition.

d. Steve Rosenstock on loading forecast

In Steve Rosenstock's absence, Phil Hopkinson gave the report embedded above regarding new anticipated loads for the United States. Three Key Trends:

1-Transportation EV charging, 2- Building Electrification – heat pumps, and 3 - Codes and Standards Developments – i.e., California no more gas installations on new constructions – yielding an increased use of heat pumps.

EEI forecast by year how many EV types are likely to be on the road. Different types of EV on the road. Charging levels class 1 – 120 V, Class 2 - 240 v (faster charging).

For commercial higher voltages and power. Will be a load increase residential, commercial and industrial.

Will impact the generators of electricity as well as transformers. New transformers will be needed for the industrial and commercial sector.

Buildings – going to heat pumps. Some employ heat strips on the heat pump to defrost the units come on at first. There are also geothermal heat pumps.

Codes and Standards are mandating more heat pumps. EEI estimates range of increase 50% load growth over the next ten years.

e. Alan Sbravati of Cargill Bioindustrial for Kevin Rapp on Liquid Materials

New Dual Nameplate kVA for Distribution Transformers–

How to estimate the increased capacity? See slide 3 of presentation below.

f. Tom Prevost on Solid Material

g. Casey Ballard on non-Kraft Paper materials

h. Al Traut for new Dual kVA Nameplate transformer ratings

Al noted that he analyzed ester and thermally upgraded kraft paper. Upgraded thermal capacity of transformers. His report below contains design and application considerations for dual kVA transformers.

i. Comments

8. Assignments for next meeting

9. Next meeting date and location- Fall 2022 – Charlotte (Sheraton/Le Meridien), North Carolina USA, October 16 – 20, 2022

10. Adjourn – Meeting was adjourned at 10:46 am

Note: Updated material will be posted prior to the meeting at

<http://transformerscommittee.org/> (under distribution transformers – TF DOE Energy eff).

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

Gary presented the following minutes from the working group meeting on March 28, 2022 at 4:45 p.m. with 60 in attendance. **Gary also brought a motion for ballot that was approved by the working group to the subcommittee. This motion was called to question with No Nay votes, No Abstentions, and 44 Yay votes. The motion was approved by the subcommittee.**

1. Call to order and Chair's remarks – Called to Order at 4:45PM by Gary Hoffman
2. Quorum Verification – Took count with 32 members and had a Quorum.
3. Approval of agenda for this meeting. No Objections. Motion by Jeff Benach, and Second by Hakim Dulac– Unanimously Approved
4. Approval of the meeting of Fall 2021 were approved. No Objections.
5. Chair reviewed the Patten and Copyright Policy Information.
6. Report on WG approved Straw Ballot of DT and SNTP SCs and Status of WG draft.
7. New Business:  
Chair requested 2 Motions:
  1. Based on successful completion and resolution of Straw Ballot to DT and SNTP SC Move for WG Member approval of PC57.167 to go to SA Ballot
  2. The Members of PC57.167 authorizes the formation of Ballot Resolution Committee to resolve all comments and are authorized to initiate of recirculation ballot.
8. Next meeting is in October 2022
9. Adjournment

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

Rhett Chrysler presented the following minutes from the working group meeting on March 29, 2022 at 1:45 p.m. with 21 in attendance.

1. Chair called the meeting to order at 1:45pm MDT. Members introduced themselves.
2. Total attendance of 21 is listed below. 11 of 21 members present and quorum was verified (52%). 4 guests requested membership.
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 (Steve Shull/Mike Thibault). Approved unanimously.
5. Motion to approve Fall 2021 meeting minutes (Lee Matthews/Ken Hampton). Approved unanimously.
6. 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 also expires 12/31/2023.
  - b. WG goal is to vote to move the document to ballot at the Fall 2022 meeting.



## 7. Old Business

- c. Follow up to the TF on editorial review, Rhett updated Figure 7 to clarify location of temporary label on submersible transformers. No comments or objections to changes. Rhett incorporated the revised figure into D3.
- d. QR code TF (Mike Thibault (chair), Steve Shull, Ken Hampton, Rhett Chrysler, Pragnesh Vyas, Alex Macias) report.
  - i. Tf report recommends allowing QR code as an optional alternate to the present barcode (one or the other, not both) when specified by the user.
  - ii. Temporary QR code specifications recommended are:
    - 1. Model 2 (38 alphanumeric characters with 15% ECC level)
    - 2. 20 character requirement (2 MFG code + 13 character serial number + 13 character user defined number)
    - 3. Minimum 2.0" x 2.0"
    - 4. 20" optimal scanning distance
  - iii. Permanent QR code specifications recommended are:
    - 1. Model 1 (20 alphanumeric characters with 15% ECC level)
    - 2. 15 character requirement (2 Mfg code + 13 character serial number)
    - 3. Minimum 1.0" x 1.0"
    - 4. 10" optimal scanning distance
  - iv. Steve Shull/Ken Hampton motion to add QR code as an option for the temporary label, when specified. Unanimously approved.
  - v. Steve Shull/Rhett Chrysler will incorporate a new temporary QR code section into D4 draft and present to the WG at the Fall 2022 meeting.
  - vi. Rhett Chrysler (chair), Andrew Larrison, Josh Verdell, Eric Thiesen to investigate permanent barcode labels and report back at the Fall 2022 meeting.

## 8. New Business - None

## 9. Next meeting October 18, 2022 in Charlotte, NC

## 10. Meeting adjourned at 2:25pm MDT.

Submitted by: Alan Traut, SecretaryDate: 3/29/2022Attendance:

First Name	Last Name	Company or Affiliation	Role
Darren	Brown	Howard Industries	Member
Rhett	Chrysler	ERMCO	Member
Craig	DeRouen	ERMCO	Guest
Kenneth	Hampton	Baltimore Gas & Electric	Member
Ramadan	Issack	American Electric Power	Member
Andrew	Larison	Hitachi ABB Power Grids	Member
Lee	Matthews	Howard Industries	Member
Daniel	Mulkey	Mulkey Engineering Inc.	Member
Dwight	Parkinson	EATON Corporation	Guest
Robert	Reepe	Georgia Power Co.	Member
Albert	Sanchez	Knoxville Utilities Board	Guest

Stephen	Shull	BBC Electrical Services, Inc.	Member
Eric	Theisen	Metglas, Inc.	Guest
Michael	Thibault	Pacific Gas & Electric	Member
Alan	Traut	Howard Industries	Member
Reinaldo	Valentin	Duke Energy	Guest
Joshua	Verdell	ERMCO	Guest*
Alan	Wilks	Consultant	Guest*
Philip	Miller	Memphis Light, Gas & Water	Guest
Angela	Leigl	EATON Corporation	Guest*
Jared	Bates	Oncor Electric Delivery	Guest*

Guest\* = Requesting Membership

### C.3 Old Business

- No old business was discussed

### C.4 New Business

- Brian Splakonski – touch temperature
  - Safety issue for transformers that are accessible to the public (Bruce Webb led TF)
    - Opportunity for a task force to begin at a higher level (with safety experts?)
      - Mulkey – what can be done to prevent this issue with regards to 1PH PMT design
        - Possibly change the shape to divert folks from putting things on a transformer (i.e. fiberglass rock)
      - Steve Shull – consider various ambient conditions
      - Lee – ADSC code should consider; utilities use a warning label similar to HV warning sign. Altering the design/shape may make it more difficult to operate
      - Dauzat – Likes Mulkey’s idea of Fiberglass rock with holes in it (mesh to prevent animal/insect ingress)
      - Brian Klaponski – reiterate task force. Paint things we can do to improve.
      - **Motion to form TF - Klaponski, Ali. No opposition, unanimous approval**
        - Question – Chrysler – any resolutions?
          - Webb – still open in 12.38
        - **Webb – Chair; Ali – Vice Chair; Add to schedule for next meeting**
- Phil Hopkinson – Inverter transformers to handle high frequency that are putting high voltages between layers of the core, leading to high gasing. Gasses disappear when core is shielded. Reactivate inverter related activities (C57.18 or wind and solar documents?) Core ground started here but finished up in PCS.
  - Gary Hoffman – Adcom will decide where it goes, but it should be done here.

- Phil Hopkinson – motion to create a TF to figure out where inverter transformers should be addressed (Dan Mulkey second), no discussion, no nays, unanimously approved
  - Volunteers to chair: none; Josh Verdell to get with Ed Smith to see if there are volunteers among the entire subcommittee.
  - Phil Hopkinson offered to chair, if no one else volunteers.

#### **C.5 Chairman’s Closing Remarks and Announcements**

Josh had no closing comments to the SC.

#### **C.6 Adjournment**

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

## List of Attendees and Affiliations:

<u>Role</u>	<u>First Name</u>	<u>Last Name</u>	<u>Company</u>
Member	Nabi	Almeida	Prolec GE
Member	Javier	Arteaga	Hitachi Energy
Member	Donald	Ayers	Ayers Transformer Consulting
Guest	Olle	Benzler	Megger
Guest	Kevin	Biggie	Weidmann Electrical Technology
Member	David	Blew	Retired (PSE&G)
Guest	Jeffrey	Britton	Phenix Technologies, Inc.
Member	Darren	Brown	Howard Industries
Member	John	Chisholm	IFD Corporation
Member	Rhett	Chrysler	ERMCO
Guest	Michael	Dahlke	Central Moloney, Inc.
Member	Thomas	Dauzat	General Electric
Guest	Craig	DeRouen	ERMCO
Guest	Michael	Faulkenberry	Retired
Guest	Reto	Fausch	RF Solutions
Guest	Bruce	Forsyth	Bruce Forsyth and Associates PLLC
Guest	George	Frimpong	Hitachi Energy
Member	Ali	Ghafourian	H-J Enterprises, Inc.
Member	Kendrick	Hamilton	Power Partners, Inc.
Member	Kenneth	Hampton	Baltimore Gas & Electric
Guest	Kyle	Heiden	EATON Corporation
Member	Sergio	Hernandez Cano	Hammond Power Solutions
Guest	John	Herron	Raytech USA
Member	Gary	Hoffman	Advanced Power Technologies
Guest	Ryan	Hogg	Bureau of Reclamation
Member	Philip	Hopkinson	HVOLT Inc.
Member	Ramadan	Issack	American Electric Power
Member	Gary	King	Howard Industries
Member	Brad	Kittrell	Consolidated Edison Co. of NY
Member	Brian	Klaponski	Carte International Inc.
Member	Andrew	Larison	Hitachi Energy
Guest	Aleksandr	Levin	Weidmann Electrical Technology
Guest	Colby	Lovins	Federal Pacific
Member	Tim-Felix	Mai	Siemens Energy
Guest	Jinesh	Malde	M&I Materials Inc.
Member	Lee	Matthews	Howard Industries
Guest	James	McBride	JMX Services, Inc.
Member	Brian	McBride	Cargill, Inc.
Guest	Thomas	Melle	HIGHVOLT
Member	Kent	Miller	T&R Electric Supply Co.
Member	Rhea	Montpool	Schneider Electric

## Annex C

Member	Charles	Morgan	Eversource Energy
Member	Michael	Morgan	Duke Energy
Member	Daniel	Mulkey	Mulkey Engineering Inc.
Member	Stephen	Oakes	WEG Transformers USA Inc.
Member	Dwight	Parkinson	EATON Corporation
Guest	Vinay	Patel	Consolidated Edison Co. of NY
Guest	Harry	Pepe	Phenix Technologies, Inc.
Guest	Matthew	Pinard	Weidmann Electrical Technology
Member	Jarrold	Prince	ERMCO
Guest	Robert	Reepe	Georgia Power Co.
Guest	Kevin	Riordan	WEG Transformers USA Inc.
Member	Albert	Sanchez	Knoxville Utilities Board
Member	Daniel	Sauer	EATON Corporation
Guest	Alan	Sbravati	Cargill, Inc.
Guest	Stefan	Schindler	Maschinenfabrik Reinhausen
Member	Jeffrey	Schneider	Power Partners/Spire Power Solutions
Member	Avijit	Shingari	Pepco Holdings Inc.
Member	Stephen	Shull	BBC Electrical Services, Inc.
Member	Audrey	Siebert-Timmer	IFD Corporation
Member	Steven	Snyder	Hitachi Energy
Guest	James	Spaulding	Fort Collins Utilities
Guest	Mike	Spurlock	Spurlock Engineering Services, LLC
Member	Markus	Stank	Maschinenfabrik Reinhausen
Guest	David	Stankes	3M
Member	Kerwin	Stretch	Siemens Energy
Guest	Liz	Sullivan	Dominion Energy
Guest	Marc	Taylor	JFE Shoji Power Canada Inc.
Member	Eric	Theisen	Metglas, Inc.
Member	Michael	Thibault	Pacific Gas & Electric
Member	Timothy	Tillery	Howard Industries
Guest	Mark	Tostrud	Dynamic Ratings, Inc.
Guest	Daniel	Tournoux	SPX Transformer Solutions, Inc.
Member	Alan	Traut	Howard Industries
Guest	Reinaldo	Valentin	Duke Energy
Guest	John	Vartanian	National Grid
Secretary	Joshua	Verdell	ERMCO
Guest	Alan	Washburn	Burns & McDonnell
Member	Bruce	Webb	Knoxville Utilities Board
Guest	Zachery	Weiss	WEG Transformers USA Inc.
Guest	William	Whitehead	H2scan Corporation
Member	Alan	Wilks	Consultant
Guest	Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden
Member	Joshua	Yun	Virginia Transformer Corp.

## Annex C

Guest	Malia	Zaman	IEEE
Guest	Michael	Zarnowski	Carte International
Member	Kyle	Zemanovic	EATON Corporation
Guest	George	Payerle	Carte
Guest	Jonas	Oliveira	Hitachi Energy
Guest	Gustavo	Leal	Dominion Energy
Guest	John	Kotula	Dominion Energy
Guest	Joe	Kelly	TCI
Guest	Josh	Adams	Quanta Underground Power Services
Guest	Andre	Simons	JFE Shoji
Guest	Stefan	Siebert	Brock AAUS
Guest	Mauricio	Soto	HE
Guest	Cesar	Diaz	EATON
Guest	Evan	Knapp	EATON
Guest	Angela	Leigl	EATON
Guest	Rich	Frye	EATON
Guest	Herton	De Oliveira Filho	PSE&G
Guest	Gerard	Puleo	Midel
Guest	Anthony	Cokes	M&I Matts
Guest	Zach	Draper	Delta-X Research

## **Annex D Dry Type Transformers Subcommittee**

**Wednesday, March 30, 2022**

**IEEE Transformer DTSC Spring 2022 Meeting Denver, CO**

**Chair: Casey Ballard**

**Vice-Chair: David Walker**

**Secretary: Dave Stankes**

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

The Dry-type Transformers Subcommittee (DTS) met in the Hyatt Regency Denver, CO on March 30, 2022, at 1:30 PM (MDT).

At start of meeting 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:*

No individual introductions were made, but Chair reminded participants to announce one's name and affiliation prior to speaking.

#### *Chairs remarks:*

Currently there is nowhere to enter attendance as AMS has been deactivated and the system that will replace it is not yet running. WG and TF chairs must retain attendance records so that they may be entered into the new system when it comes online. As attendance should be included as part of the minutes from WG and TF meetings, this would be an acceptable way to retain attendance records.

WG and TF minutes from Spring meeting are requested to be turned into Dave Stankes (Secretary) by April 15<sup>th</sup> so our subcommittee minutes can be submitted on time. DTS was last subcommittee to turn in minutes from Fall 2021 meeting and we do not want to repeat this.

Chair announced that there will be new required training for all the officers (TF, WG, Subcommittee, Main Committee). People already in a leadership role must complete training before the end of the year. Chair believes that people that are assuming leadership role for first time may need to complete the training prior to starting their new role. Exact timing on completing the training is still being determined. It is expected that it will take on average 6 to 8 hours to complete the training. Chair that if anyone had concerns regarding the training, they should voice these with Malia Zaman. Tom Prevost asked what the ramifications were of not completing the training, and Chair answered that he did not know. Chair cited that the training tool would be especially useful for new leaders, providing them with a roadmap of what to do. Reminded attendees that regardless of the number of years' experience in leadership roles, everyone will need to complete the training.

IEEE is creating a place to put documents that we use to create standards, IEEE SA Contributor Collection. Contributions may be different types of documents ranging from pure research to technical analysis, complete technical specifications and use cases. An example of something that could be stored is a tool that we may use to help create a graph. If the Contribution is used in the standard, we could then reference web location (storage area) of the content.

In addition to the patent right and copyright slides that are required to be shown prior to starting a meeting, new slides on expected behavior, code of conduct, and guidance on voting will need to be shown. The guidance on voting reinforces the need for people to vote based on their own beliefs and not on that of their company or other influences and reinforces that IEEE activities shall allow fair and equitable consideration of all viewpoints.

Chair reviewed the need to review copyright information prior to meetings and believes the DTS is doing a good job of adhering to this requirement. If it is an IEEE Transformer Committee document, we can share it.

Chair encouraged TF/WG leaders to utilize virtual meetings held between the Spring/Fall meetings to help accelerate progress on documents. Highlighted the successful use of virtual meeting by Joe Tedesco who used these to rapidly complete work on C57.12.52. Reminded leaders to notify the Chair if a virtual meeting is scheduled so he can share with the SC in case there were other individuals who would like to attend. Also send information regarding the meeting to Sue McNelly so it can be posted on the IEEE Transformer Committee website. Meeting minutes must be prepared these should be part of the minutes from the next in person meeting.

Reminded WG Chairs to maintain up to date membership lists. Members who have missed 2 of the last 3 meetings should be contacted to see if they intend to attend the next meeting. Remove all who have communicated they will no longer be participating. If member status of a person is changed, you must contact the person and explain why his/her status is being changed.

The meeting was convened with 28 people in attendance 17 of the 32 members of the DTS were present, so quorum was reached. Chair noted that the slide showing members shared during the meeting must be updated, including removing two people that have notified us they will no longer participate (John John and Juan Pablo Medina) and adding missing member (Maish Saraf).

*Approval of agenda and meeting minutes:*

Chair entertained a motion to approve the planned agenda that was displayed at the meeting. Motion to Approve – Tim-Felix Mai, 2nd – Rhea Montpool. Agenda was approved unanimously.

Chair entertained a motion to approve the Fall 2021 DTS meeting minutes that were posted on the Transformer Committee website. Motion to Approve - Aniruddha Narawane, 2nd – Klaus Pointner. The minutes from the Fall 2021 DTS meeting were approved unanimously.

Due to the possibility of some members of the DTS having to leave early from this meeting, the Chair asked WG or TF Chairs if there were any motions that needed to come before the DTS for a vote. Two WG Chairs noted that they had motions in need of DTS approval (Colby Lovins WG Chair of C57.134 and Art Del Rio WG Chair of C57.16). These were moved up in the order of the agenda as to not lose quorum due to the possibility of any DTS members leaving early.

## **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 PC57.134 Chair Colby Lovins**

Chair: Colby Lovins

Acting Secretary: Joseph Tedesco

This was the third meeting of the IEEE C57.134 Working Group. The meeting was held in the Mineral Hall A Meeting Room and Colby Lovins called the meeting to order at 3:16 PM.

There were 18 people present in the meeting. There were 10 members and 8 guests. 3 guests requested membership. The Working Group had 17 members; therefore, a quorum was reached, and business could proceed.



Colby presented the agenda and asked for a motion to approve it. Casey Ballard made a motion to accept the agenda and it was seconded by Tim-Felix Mai. Approval was unanimous, and the agenda was approved.

Colby then asked for a motion to approve the minutes of the last two Working Group meetings. Tim-Felix Mai made the motion and Casey Ballard seconded it. There was unanimous approval, and both sets of minutes were approved.

The patent slides were shown, and the copyright policy was discussed. There were no essential patent claims.

**Old Business:**

- Colby reviewed the task forces.
- Colby continued reviewing the draft, starting with Section 4.

**New Business:**

- Colby discussed potential changes to Section 5.2, including additional details about encapsulation, ambient temperatures, stabilizing materials, and conductors.
  - Tim-Felix Mai made a motion to accept the changes, and Ken Klein seconded the motion. There was no discussion.
    - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Colby reviewed the proposal for the location of temperature sensors in Section 5.3.2, discussing changes in wording and details about how the location to position the temperature sensors may be determined.
  - Ken Klein made a motion to accept the changes, and Dave Stankes seconded the motion. There was no discussion.
    - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- There was a discussion about the wording about the value of the exponent  $n$ . It would refer to C57.12.91 for values. Manish Saraf asked about the inclusion of sealed/nonventilated transformers, and Casey Ballard suggested that the wording be updated to avoid implying that there were only two types of transformers (ventilated self-cooled and ventilated forced air-cooled).
  - Casey Ballard made a motion to accept the revised wording, and Ken Klein seconded the motion. There was no further discussion.
    - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Colby discussed conversations he had with Chuck Johnson and Paulette Powell-Payne about the Annex. They had suggested reorganizing sections and changing some wording.
  - Ken Klein made a motion to accept the changes, and Dave Stankes seconded the motion.
    - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Roger Wicks suggested looking at Section 2 to determine if the Normative References could be updated. C57.12.01 and C57.12.80 were added (they had been in the Bibliography).

## Annex D

- Colby had originally planned to leave the Bibliography to later, but Tim-Felix suggested removing older references from the Bibliography. There was discussion about whether older references should be left in.
- Casey Ballard made a motion to send the draft to the subcommittee for a vote to go to SA ballot, and Sasha Levin seconded the motion. There was discussion about whether doing that skipped Tim-Felix and Dave's potential work on updating the Bibliography. Casey held that if there were problems with the Bibliography, they would be indicated during balloting. Dave preferred to review the references and update them, if necessary, with a vote for the draft to go to the subcommittee to be handled virtually.
  - Vote: 6 for, 1 against, 3 abstentions.
    - 7 of the 10 members present voted (70%), exceeding the requirement that 67% of the quorum vote.
    - 6 of the 7 votes were affirmative (86%), exceeding the requirement that 51% of the votes be affirmative.
      - Having met both the requirements for the draft to be sent to subcommittee, the motion PASSED.
- Casey Ballard made a second motion to establish a Comment Resolution Group (CRG) with an odd number of members that was empowered to make changes to the draft without seeking approval of the Working Group. Ken Klein seconded the motion. There was no discussion.
  - Vote: 10 for, 0 against, 0 abstentions. Motion PASSED.
- Colby asked for volunteers for the CRG.
  - Colby Lovins, Joe Tedesco, Ken Klein, Casey Ballard, and Tim-Felix Mai volunteered.

Colby informed the Working Group that, prior to the Spring 2022 meeting, Juan Pablo Medina had stepped back from his IEEE responsibilities. Colby asked if there were any volunteers, and there were none. He asked if there would be objection to Joe being appointed as the new Secretary, and there was unanimous consent.

The date of the next meeting was not announced.

The meeting was adjourned at 4:12 PM.

At the DTS a **motion** was made by Colby Lovins that the current draft of C57.134 be submitted for the SA Ballot process. The motion was seconded by Ken Klein.

**Discussion:** Tom Prevost asked if the working group had a 2/3 majority. Colby answered yes (86% approval to send document to ballot.)

Chair asked if anyone objected to unanimous approval of the motion. No one objected.

Chair asked if anyone abstained from voting. No one abstained.

**Motion was approved.**

Chair thanked Colby for moving the document so quickly to ballot.

ATTENDANCE

Role	First Name	Last Name	Affiliation
Member	Robert	Ballard	DuPont
Guest	Tim	Holdway	Dogwood Marketing
Guest	Jeremy	Johnson	Intermountain Electronics
Member	Ken	Klein	Johnson Electric
Member	Aleksandr	Levin	Weidmann Electrical Technology
Chair	Colby	Lovins	Federal Pacific
Guest	Kushal	Mahajan	Eaton
Member	Tim-Felix	Mai	Siemens Energy
Guest	Aniruddha	Narawane	EATON Corporation
Guest	Vinay	Patel	Consolidated Edison Co. of NY
Member	Chris	Powell	Intermountain Electronics
Guest	Afshin	Rezaei-Zare	York University
Member	Manish	Saraf	Hammond Power Solutions
Guest	Brian	Sonnenberg	Instrument Transformers, LLC
Member	David	Stankes	3M
Member	Joseph	Tedesco	Hitachi Energy
Guest	Muhammad	Wazir	Eaton
Member	Roger	Wicks	DuPont

### D.2.2 Revision of IEEE C57.16 Chair Art Del Rio

#### PC57.16 Standard for Requirements, Terminology, and Test Code for Dry-Type Air-Core Series-Connected Reactors

**Denver, CO, USA**

**Hyatt Regency Denver Hotel**

**Monday, March 28, 2022**

The working group for the revision of C57.16 met in the Centennial H room of the Hyatt Regency Denver Hotel on Monday March 28, 2022, at 9:30 AM.

#### 1. Introductions and Call for Patents

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

#### 2. Verification of Quorum

- There was a total of 18 participants: 5 Members and 13 Guests out of which two guests requested membership.
- 5 of the current 11 WG Members were present and no quorum to carry out business was met.

#### 3. Approval of the meeting agenda of the December 14, 2021, supplemental virtual meeting

- The meeting agenda, which was circulated by email among members and guests on March 24, 2022 by email, was presented to the participants.
- The agenda will be circulated among the WG members for voting. The alternatives will be Approve, Disapprove or Abstain to approve the agenda.

#### **4. Approval of the minutes of the December 14, 2021, supplemental virtual meeting**

- The minutes from the supplemental meeting, which were circulated on March 24, 2022 by email, will be circulated among the WG members for voting. The alternatives will be Approve, Disapprove or Abstain to approve the minutes.

#### **5. Review the draft document distributed among members; next step.**

- The draft standard, IEEE C57.16/D5, which was circulated on March 24 was discussed.
- All changes from the beginning of the revision work are marked in colors.
  - Yellow parts are the changes
  - Grey are parts that should be discussed
  - Red are parts that are proposed to be deleted
- Discussion of the grey parts:
  - Clause 7.2.5. The text regarding the relation of three-phase short-circuit currents and single line-to-ground fault currents, for three-phase reactors, should be verified. The WG Chair, Art Del Rio, will check with Dave Caverly and Pierre Riffon who has been mostly involved in this.
  - Clause 9.1, note “a” under Table 6. The background to this note, regarding reduced insulation levels across reactors by a parallel surge arrester, is not clear. It makes sense because sometimes it will be a more optimal solution with a smaller reactor if it is protected by a parallel surge arrester. This text is maybe coming from Pierre Riffon. The WG Chair, Art Del Rio, will check with him.
  - Clause C.4.3, NOTE 15 regarding slightly modified discharge frequency if a damping resistor is included. The changed frequency is probably due to the stray inductance of the resistor. The WG Chair, Art Del Rio, will check with Pierre Riffon.
- Discussion of the red parts:
  - The red parts are four standards in the bibliography which are not referred to in the standard. They should be removed.
- Discussion of other parts:
  - The latest draft of the standard is considered to be in good shape, mostly thanks to Dave Caverly who has done most of the job.
  - Annex A (Specific requirements for dry-type air-core filter reactors) is considered to be in good shape. Klaus Pointner volunteered to anyway go through it thoroughly to ensure that it fits together.
  - Klaus Pointner mentioned that Annex G (Converter reactor applications) does not have a bibliography. It was concluded that a bibliography is not needed for Annex G since it does not refer to any other standards. Testing of AC side converter reactors is quite straight forward according to the test in the main parts of C57.16.

#### **6. Discussion**

- We need to get approval by Cigré for material that we have copied from their documents.

- Our PAR expires December 31 this year. We might get an extension with one extra year if we apply for that in October. Anyway, we must do our best to finalize the work as soon as possible.
- We should try to get approval from the Dry Type SC as soon as possible to get approval to start the ballot process. The SC requires a simple majority to pass.
- Prior to a possible SC approval, we must get a 2/3 approval by the WG members to ask the SC for approval to start the ballot process. Since we don't have quorum, we will try to get the WG approval via email.
- The ballot process will in short be:
  - The WG Chair will invite any interested parties to join the ballot pool. The invitation period is normally 30 days.
  - The ballot normally runs for 30 days.
  - A Ballot Resolution Group should then review and answer the comments minimize the negative votes in a recirculation ballot.
  - Normally a recirculation ballot is needed. The minimum time is 10 days.
  - Submit to RevCom

## 5. New Business

- There was no new business.

## 6. Adjournment

- The meeting was adjourned at 10:20 AM.

Next meeting: Fall 2022 – Charlotte (Sheraton/Le Meridien), North Carolina USA, October 16 – 20, 2022

Attendance S22 list and membership status.

<b>Role</b>	<b>First Name</b>	<b>Last Name</b>	<b>Company</b>
Guest	Gilles	Bargone	FISO
Chair	Art	Del Rio	Siemens Energy
Guest	Jonathan	Deverick	Dominion Energy
Guest	Thomas	Falkenburger	Coil Innovation USA, Inc.
Guest	Jeffrey	Gragert	Xcel Energy
Guest	Kendrick	Hamilton	Power Partners, Inc.
Guest	Derek	Hollrah	Burns & McDonnell
Guest	Kurt	Kaineder	Siemens Energy
Guest	Ken	Klein	Grand Power Systems
Guest	Kushal	Mahajan	Eaton
Member	William	Munn	Southern Company Services
Guest	Aniruddha	Narawane	Eaton
Member	Klaus	Pointner	Trench Austria GmbH
Secretary	Ulf	Radbrandt	Hitachi Energy
Guest	Manish	Saraf	Hammond Power Solutions, Inc
Member	Michael	Sharp	Trench Limited
Guest	Muhammad	Wazir	Eaton
Guest	Malia	Zaman	IEEE

Note: Since there was no quorum during the meeting, an e-mail vote among WG Members was carried out prior to the Wednesday March 30<sup>th</sup>, 2022, Dry-Type Subcommittee meeting.

**Original Message** (C/W attachments)

Subject: RE: Members only / WG on revision of C57.16 Dry Type air core reactors.  
S22 Denver, CO / Motion to SA Ballot by WG  
Sent: Mon, 3/28/2022 3:47 PM  
From: Del Rio, Javier Arturo ([javier.del\\_rio@siemens-energy.com](mailto:javier.del_rio@siemens-energy.com))

Dear Member of WG C57.16,

We had the scheduled meeting this morning, unfortunately we were not able to reach quorum. We have decided to take a vote via e-mail on the approval of the agenda, previous meeting minutes and our intent to move the latest draft of IEEE C57.16 to SA ballot.

Please reply with your vote before the SC meeting, March 30<sup>th</sup>, 11 am MT (Denver time) of

**APPROVE** (you approve the agenda and minutes and support moving to SA ballot)

**DON'T APPROVE** ( you don't approve the agenda and minutes you do not support moving to SA ballot)

**ABSTAIN**

As a reminder, the PAR extension for this WG expires the end of December 2022.

With kind regards  
Art Del Rio

+++++

The compilation of the responses for the approvals:

Approve	Minutes	Agenda	Ballot
David Caverly	1	1	1
J. Arturo Del Rio	1	1	1
Alexander Gaun	1	1	1
William Munn	1	1	1
Caroline Peterson	No response	No response	No response
Sylvain Plante	1	1	1
Klaus Pointner	1	1	1
Ulf Radbrandt	1	1	1
Pierre Riffon	1	1	1
Devki Sharma	1	1	1
Michael Sharp	1	1	1

Casey Ballard (SC Chair)	1	1	1
Total Approvals	11	11	11
Total Approval rate [%]	91%	91%	91%

Respectfully submitted,  
Chairman: Art Del Rio (a.delrio@ieee.org)  
Secretary: Ulf Radbrandt (ulf.radbrandt@ieee.org)

At the DTS a **motion** was made by Art Del Rio that the current draft of C57.16 be submitted for the SA Ballot process. The motion was seconded by Mike Sharp.

**Discussion:** None

Chair asked if anyone objected to unanimous approval of the motion. No one objected.

Chair asked if anyone abstained from voting. No one abstained.

**Motion was approved.**

Chair asked Art if the WG has formed a comment resolution group. Art answered that one has not yet been formed as they did not have a quorum at this meeting.

Chair thanked Art for moving this important document forward. Art in turn thanked Klaus Pointner, Mike Sharp and David Caverly for their contribution.

## Virtual Meeting

**Monday, December 14, 2021**

The working group for the revision of C57.16 met virtually in Teams on Tuesday December 14, 2021, at 9:00 AM, Eastern Time.

### 1. Participants

Art Del Rio	Siemens Energy	Chair
David Caverly	Trench Limited	Vice Chair
Ulf Radbrandt	Hitachi ABB Power Grids	Secretary
Caroline Peterson	Xcel Energy	Member
Sylvain Plante	Hydro-Quebec	Member
Klaus Pointner	Trench Austria GmbH	Member
Michael Sharp	Trench Limited	Member
Jonathan Deverick	Dominion Energy	Guest
Saurabh Ghosh	General Electric	Guest
Kurt Kaineder	Siemens Energy	Guest
Ken Klein	Grand Power Systems	Guest
Hemchandra Shertukde	University of Hartford	Guest
Brad Staley	Salt River Project	Guest
Helena Wilhelm	Vegoor Tecnologia Aplicada	Guest
Malia Zaman	IEEE SA	Guest

## 2. Introductions and Call for Patents

- The meeting was called to order at 9:00 AM by the WG Chair Art Del Rio.

## 3. Verification of Quorum

- There was a total of 14 participants: 7 Members and 7 Guests
- 7 of the current 11 WG Members were present and quorum to carry out business was met.
- The meeting agenda, which was circulated by email among members and guests on December 8, 2021, by email, was presented to the participants. There were no objections or comments, and the agenda was approved unanimously.
- The minutes of the F21 November 15th, 2021, Virtual meeting, which was circulated by email among members and guests on December 8, 2021, by email, was unanimously approved

## 4. Discuss and review, Dave Caverly

- Dave Caverly gave a presentation regarding the latest activities regarding
  - Annex B - Dry-type air-core shunt capacitor reactors.
    - B.3.1 General
 

The text regarding shunt capacitor reactor is subject to inrush current transients has been updated since the Fall 2021 meeting. It is now clearer regarding the reduction of BIL and effect on short circuit current if a surge arrester is located in parallel with the reactor.
  - Annex B1 – Informative. Supplementary to Annex B
    - B1.5.0 Typical arrangements
 

The explanation for Figure 3c with neutral side TLI, is corrected.
    - B1.7.5 Risk Assessment
 

The text is updated to explain that the main effect of applying a MOV across the reactor is to reduce the BIL of the reactor but it might also reduce the short circuit current of the reactor.
- Annex F System considerations, TRV
  - This Annex is unchanged since last meeting.

## 5. Coming work for this WG

- Malia Zaman to give brief summary for next step for us. .
  - Basically, when WG approves the drafts, the SC should approve it too before initiation of a SA ballot.
  - The WG should decide how to proceed.
  - Will the whole WG be the Comment Resolution Group (CRG) or should a smaller group be created?
- Mike Sharp asked if we have talked about Cigré agreement? We do have permission to use material from Cigré if we just use what specified. We shouldn't use whole document.
- We should have one more meeting in and of January and then ask SC for approval to go to Ballot at end of March.
- Deadline is 17 of January all feedback ready. Draft to be circulated before February 1.
- Caroline Peterson and Ulf Radbrandt can help to support as consultant in Word.

## 6. Adjournment



- The meeting was adjourned at 10:02 AM.

Respectfully submitted,  
 Chairman: Art Del Rio (a.delrio@ieee.org)  
 Secretary: Ulf Radbrandt (ulf.radbrandt@ieee.org)

### **D.2.3 Revision of C57.12.59 Chair Derek Foster (not present) (Casey Ballard offered comments on Derek's behalf)**

Derek Foster TF Chair, David Walker Vice Chair, and Tim-Felix Mai Secretary were tasked with reviewing the document and submitting recommendation for Title, Scope, and Purpose for a proposed PAR for the revision of C57.12.59. The team recommended that Title (IEEE Std C57.12.59 IEEE Guide for Dry-Type Transformer Through-Fault Current Duration) and Purpose would remain unchanged from current document. TF also submitted proposed recommendations for changes to the Scope (proposed changes in green) and these were shown to the DTS.

#### **1.2 Purpose**

This guide sets forth recommendations believed essential for the application of overcurrent protective devices that limit the exposure time of dry-type transformers to short-circuit currents. This guide is not intended to imply overload capability.

## **Current**

#### **1.1 Scope**

This guide for dry-type transformer through-fault current duration applies to dry-type distribution and power transformers built in accordance with C57.12.01

## **Proposed**

#### **1.1 Scope**

This guide for dry-type transformer through-fault current duration applies to dry-type distribution and power transformers built in accordance with C57.12.01 **and referenced as Categories I, II and III.**

The TF had previously approved a motion to submit the PAR to the DTS for approval and grant permission to submit their PAR for approval.

Chair asked if anyone would like to make a motion on the TF's behalf that the DTS approve the PAR and allow it to move forward with submission.

Tim-Felix Mai made a **motion** that the DTS approve the PAR and allow it to move forward with submission. Aniruddha Narawane seconded the motion.

**Discussion:** None

Chair asked if anyone objected to unanimous approval of the motion. No one objected.

**Motion was approved.**

Chair asked that Tim-Felix Mai as an officer of the TF share the good news with Derek and David that the motion was carried and request that they go ahead with the PAR submittal.

**D.2.4 Revision of IEEE C57.12.52    Chair Joseph Tedesco**

Minutes – IEEE C57.12.52 – WG – Sealed Dry- Type Transformers.

Meeting held in Mineral Hall B-C, at the Hyatt Regency Denver at the Convention Center

Meeting started at 11:00 am by Chair Joseph Tedesco

The Secretary, David Walker, was unable to attend. Roger Wicks volunteered to be acting Secretary for the meeting.

Joe reviewed the agenda, introduction of the attendees was conducted. A Quorum was reached (with 7 of the 13 members present), so the minutes from last fall's meeting and the agenda were approved. (Casey Ballard made the motion and Colby Lovins seconded the motion.) There were 7 members and 18 guests in attendance. Due to the work being completed, the working group was not accepting new members.

Joe reviewed the guidelines and patent policy and there were no issues raised by the attendees. Joe the spent the rest of the meeting reviewing the status of the document.

- Due to prior meetings, a PAR revision was agreed to and submitted to Revcom and it was approved.
- An email ballot was conducted of the working group members regarding readiness to go to ballot, and this was approved unanimously by the working group (10 members with 3 abstentions).
- The subcommittee was then polled and they too agreed that the document was ready to go to ballot (the procedures were followed by the working group). 20/33 members voted with unanimous approval.
- Joe then solicited a single volunteer (Aniruddha Narawane) to add to six initial members of the CRG to make sure there is an odd number.
- Joe then finished the discussion by outlining the final steps of the document (SA Ballot, comment resolution (if needed) and recirculation (if needed)).

The meeting adjourned at 11:12 am.

Chair asked if anyone had heard that if you conduct an email ballot you must have 2/3 response rate instead of 50% for in person ballot? (He had heard this mentioned at other meetings during the week, but was not aware of this in any IEEE manual.) No one had heard of this requirement. Chair suggested to be sure that the approval to go to ballot was valid, that Joe submits another motion to the DTS requesting that the draft in current form as approved by the working group be submitted for SA ballot. (Chair will check on the requirement for electronic motion and if different than for what is required for in person voting he will send an email out to members and guests of the DTS informing them of the new rules.)

Joe Tedesco made a **motion** to the DTS requesting that the draft in current form as approved by the working group be submitted for SA ballot.

Motion was seconded by Kerwin Stretch.

**Discussion:** None

Chair asked if anyone objected to unanimous approval of the motion. No one objected.

**Motion was approved.**

#### ATTENDANCE

Role	First Name	Last Name	Affiliation
Member	Robert	Ballard	DuPont
Guest	Solomon	Chiang	The Gund Company
Member	Sergio	Hernandez Cano	Hammond Power Solutions
Guest	Tim	Holdway	Dogwood Marketing
Guest	Phil	Hopkinson	HVOLT Inc.
Guest	Jeremy	Johnson	Intermountain Electronics
Guest	Ken	Klein	Johnson Electric
Guest	Aleksandr	Levin	Weidmann Electrical Technology
Member	Colby	Lovins	Federal Pacific
Guest	Kushal	Mahajan	Eaton
Member	Tim-Felix	Mai	Siemens Energy
Guest	Ken	McKinney	UL
Guest	Aniruddha	Narawane	EATON Corporation
Guest	Vinay	Patel	Consolidated Edison Co. of NY
Member	Chris	Powell	Intermountain Electronics
Guest	Chad	Powell	Hitachi Energy
Guest	Manish	Saraf	Hammond Power Solutions
Guest	Dan	Sauer	Eaton
Guest	Pulal	Selvaraj	VA Transformer
Guest	Brian	Sonnenberg	Instrument Transformers, LLC
Member	David	Stankes	3M
Guest	Kerwin	Stretch	Siemens Energy
Chair	Joseph	Tedesco	Hitachi Energy
Guest	Muhammad	Wazir	Eaton
Guest	Roger	Wicks	DuPont

#### D.2.5 Revision for IEEE Revision of C57.12.01

Chair Casey Ballard

The meeting was called to order at 1:45 pm MDT by Chair Casey Ballard.

Chair made opening comments and leaders of the WG were introduced.

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

Chair noted that, as this is the first WG meeting, the membership can be requested.

Attendance was collected and the meeting was convened with 27 participants, 22 participants have requested and were granted membership in the WG comprising a quorum for this meeting. The list of attendees is presented at the end of this report.

*The Meeting Agenda* was reviewed.

Motion: “approve the agenda”, moved by A. Narawane, seconded by K. Stretch, approved unanimously.

*The Unapproved Minutes* of the Fall 2021 meeting was reviewed.

Motion: “approve the Fall 2021 Meeting Minutes”, moved by T-F. Mai, seconded by A. Narawane, 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 used the attached presentation to guide the meeting:



IEEE C57-12-01  
Spring 22.pptx

## **Old Business**

*Status of PAR at NesCom:* PAR has been approved and WG is formed.

## **New Business**

- Review/modify list of the potential new topics to be addressed in the standard revision.

Chair propose that smaller TF are formed addressing different topics that WG decides to work on.

- Average Ambient Temperature harmonization with IEC.

- T-F. Mai proposed a motion on the temperature limit: “Add 20 °C as maximum yearly average temperature of cooling air in the next revision of the standard”. K. Klein seconded the motion.

Discussion: such decision will contradict to other IEEE standard, do we want to establish this only for dry-type transformers? There is a difference between IEEE and IEC in this regard, but all IEEE documents would have be revised in this regard. Vote: 1 in favor, 14 are opposed; motion failed.

- T-F. Mai proposed a new motion: “Add maximum yearly average cooling temperature”. This motion wasn’t seconded.

- Transportation and storage conditions

- T-F. Mai proposed a motion: “Add that, if there are transport size or weight limits, they should be specified by the purchaser. Add transport acceleration, for example, the transformer shall withstand an acceleration of 1 G in all directions”. K. Stretch seconded. Discussion: 1 G is a very low, insignificant acceleration. Is only unusual conditions shall be specified? Vote: 3 in favor, 11 opposed, 5 abstain; motion failed.

- T-F. Mai proposed a motion: “Add a low temperature limit for transportation and storage”. Seconded by R. Montpool. Discussion: the lower temperature limit is important for cast coil only. We don’t want to separate requirements by technology. Vote: 17 in favor, 3 abstained; **motion passed.**

- Climatic classes

- T-F. Mai proposed a motion: “Standardize storage and operational temperatures”. This motion wasn’t seconded.

- Environmental Conditions

- T-F. Mai proposed a motion: “Do we want to define environmental conditions?” Seconded by D. Stankes. Discussion: some of these requirements are in IEEE C57.94. Vote: unanimously in favor, **motion passed.**

Chair ask all participants to indicate their interest in the following topics:

- Environmental Requirements
  - Thermal ShockNo interest.
- Salt Fog
- Will be in the environmental conditions consideration (see above).
- Fire Performance

**7 participants were interested.**

- Solid cast pole mounted transformers.

**6 participants were interested.**

- eV charging infrastructure (harmonics, loading)

No interest.

- On-load tap changers.

**4 participants were interested.**

- Thermal calculations for short circuit – any updates from IEC?

This has already been addressed in the current standard.

- 100 kV class equipment

No interest.

- Impulse levels pending Dielectric Test SC report.

**Shall be clarified.**

- Differentiation of Power vs Distribution transformers (like liquid filled).

No interest.

- Remove the short circuit current limitation of 25 times and define a new limit.

**11 participants were interested.**

- Include 50Hz requirements wherever 60Hz currently appears in the document.

**1 participant was interested.**

- QC impulse test

**6 participants were interested.**

- Negative impulse and associated test levels

**7 participants were interested.**

- Alternative energy generation

No interest.

S. Shull noted activities on HF transformers (solid-state transformers) to be considered at some future point.

- Pass/Fail criteria for insulation resistance

**13 participants were interested.**

- Pass/Fail criteria for power factor

**12 participants were interested.**

Chair requested members and participants to select one or several topics and develop a proposal on what we would like to accomplish.

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

Chair: Casey Ballard  
Secretary: Sasha Levin

Aniruddha Narwane had a comment during the DTS meeting about the possibility of looking at Insulation Resistance values for dry-type transformers, coordinating with the TF for the revision of C57.12.91.

### **Meeting Participants List**

1 Robert Ballard	DuPont	Chair
2 Aleksandr Levin	Weidmann Electrical Technology	Secretary
3 Aniruddha Narwane	Power Distribution, Inc.	Member
4 Kerwin Stretch	Siemens Energy	Member
5 Solomon Chiang	The Gund Company	Member
6 Tim-Felix Mai	Siemens Energy	Member
7 Rhea Montpool	Schneider Electric	Member
8 Ken Klein	Grand Power Systems	Member
9 Joseph Tedesco	Hitachi ABB Power Grids	Member
10 Colby Lovins	Federal Pacific Transformer	Member
11 Brian Sonnenberg	Instrument Transformers, LLC	Member
12 Manish Saraf	Hammond Power Solutions	Member
13 Dave Stankes	3M	Member
14 Weijun Li	Braintree Electric Light Department	Member
15 Manajan Kushal	Eaton	Member
16 Eduardo Gomez		
Hennig	Siemens Energy	Member
17 Ken McKinney	UL	Member
18 Bob Fyrer	DuPont	Member
19 Jonathan Deverick	Dominion Energy	Guest
20 Muhammad Wazir	Eaton	Member
21 Giovanni Hernandez	Virginia Transformer Corp.	Member
22 Jeremy Johnson	Intermountain Electronics	Guest
23 Chris Powell	Intermountain Electronics	Member
24 Vinay Patel	ConEd	Guest
25 Tim Holdway	Dogwood MKT	Guest
26 Ryan Hogg	Bureau of Reclamation	Member
27 Thomas Falken-Burger	Coil Innovation	Guest

#### **D.2.6 Revision for IEEE 259**

**Chair Dave Stankes**

Chair: David Stankes  
Vice-Chair/Secretary: Joseph Tedesco

This was the fourth meeting of the IEEE 259 Working Group. The meeting was held in the Mineral Hall B-C Meeting Room and Dave Stankes called the meeting to order at 4:47 PM.

This was the first in-person meeting in over two years, and quick introductions were made by everyone in attendance. Dave advertised the open position of Secretary. There were no immediate volunteers..

There were 22 people present in the meeting. There were 9 members and 13 guests. No one requested membership. The Working Group had 17 members; therefore, a quorum was reached, and business could proceed.

Dave discussed the revised agenda and asked for a motion to approve it. Colby Lovins moved to accept the revised agenda, with Tim-Felix Mai seconding the motion. There was no discussion, and approval was unanimous. The revised agenda was approved.

Dave then asked for a motion to approve the minutes of the last meeting, which had been held virtually in early March 2022. Aniruddha Narawane so moved, with a second from Roger Wicks. There was no discussion, and approval was unanimous. The minutes from the last meeting were approved.

Dave had sent out the patent and copyright slides prior to the meeting. 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 briefly discussed the history of the standard and the status of the revised draft. He pointed out that Ed Van Vooren had made an initial attempt at creating a first draft, reorganizing and revising it. Dave began reviewing this draft, as a starting point for discussions.
- The first point of contention was that the scope in the revised draft didn't match the scope in the PAR. That scope covered up to 600 V, while the revised draft included voltages above 600 V. It was noted that, while it was possible to revise the scope to include higher voltages, doing so would put IEEE 259 into conflict with the scope of C57.12.60, which starts at 601 V. Such a conflict would likely lead to the PAR revision being rejected.
- Dan Sauer and Casey Ballard asked if the solution would be to reopen C57.12.60 and take out all references to voltage. There was a question about the consequences of doing this, which was directed at Roger Wicks (former chair of C57.12.60). Roger pointed out that IEEE 259 was mentioned in conjunction with LV, so if you removed all mention of voltages, what would you do for LV?
- Sasha Levin asked if the same materials could be used in LV and HV coils? Manish Saraf also asked if dielectric and mechanical stresses could be considered in the aging? There was a discussion around both points, that the same materials could be used and also that thermal degradation was the chief means of aging, particularly in LV transformer, where other stresses are generally low.
- There was a discussion regarding the voltage ranges covered by other standards bodies, namely UL, NEMA, and NEC. All consider LV to cover up to 1000 V.
- The question of changing the scope of C57.12.60 down to 0 V was considered, and what the consequences would be. The point was made that doing so would invalidate all LV

## **Annex D**

insulation systems approved using UL 1446. Colby Lovins pointed out that users would likely keep using their established systems, even if they had been approved with UL 1446, because they would have the history of operation in the field.

- There was a discussion regarding what standards are reference. UL 1562 (MV transformers) explicitly references C57.12.60, while UL 1561 (general purpose transformers) explicitly references UL 1446. Similarly, Colby Lovins read off the recently balloted draft of NEMA ST-20, which also references UL 1446.
- It was noted that IEC 61857-21 is essentially the sister document to UL 1446, and any IEEE standards could be updated to refer to IEC 61857-21.
- Dave noted that there were major questions still outstanding.
  - How to handle the difference between 40,000 hours in C57.12.60 and the 20,000 hours in IEEE 259?
    - This is essentially a distinction between MV and LV.
  - How to handle RTI vs. TI? Should IEEE 259 remain a RTI test method?
    - IEEE 259 is a RTI test, requiring a reference. C57.12.60 is a TI test, which is independent of any references.
  - How to handle the overlap in voltages between the standards?
  - Could the additional work done in the revision be moved to an appendix, so that it would not be lost?
- Dave reminded everyone that there were individual Task Forces working on the various sections of the draft, and ultimately, the proposals for what to do with the sections would come from them. After stating this, he resumed reviewing the draft.
- The question was asked that if IEEE 259 became a TI, how different was it from C57.12.60? There was some discussion around this question.
- There was also an issue raised that current LV test methods lead to materials being qualified for voltage ranges where those materials would not actually pass tests in a real transformer. It was further pointed out that this was likely not a concern for established manufacturers, but for newcomers to the market.

### **New Business:**

- Dave Stankes stated that his plan was for the individual Task Forces to meet over the next few months and to reach a conclusion on a plan for the draft before the meeting in Charlotte this Fall.

The date of the next meeting for the whole Working Group will be either October 17 or October 18, 2022. That meeting will be in Charlotte, NC.

The meeting was adjourned at 6:03 PM.

## **ATTENDANCE**



Role	First Name	Last Name	Affiliation
Member	Robert	Ballard	DuPont
Member	Solomon	Chiang	The Gund Company
Guest	Sergio	Hernandez Cano	Hammond Power Solutions
Guest	Tim	Holdway	Dogwood Marketing
Guest	Jeremy	Johnson	Intermountain Electronics
Guest	Ken	Klein	Johnson Electric
Guest	John	Kotula	Dominion Energy
Member	Aleksandr	Levin	Weidmann Electrical Technology
Guest	Chau	Li	Eaton
Member	Colby	Lovins	Federal Pacific
Guest	Kushal	Mahajan	Eaton
Member	Tim-Felix	Mai	Siemens Energy
Guest	Ken	McKinney	UL
Guest	Rhea	Montpool	Schneider Electric
Guest	Chris	Powell	Intermountain Electronics
Member	Manish	Saraf	Hammond Power Solutions
Guest	Dan	Sauer	Eaton
Guest	Brian	Sonnenberg	Instrument Transformers, LLC
Chair	David	Stankes	3M
Secretary	Joseph	Tedesco	Hitachi Energy
Guest	Muhammad	Wazir	Eaton
Member	Roger	Wicks	DuPont

### D.2.7 Revision of IEEE C57.94

### Vice Chair Dave Stankes

The Working Group met in Centennial F Meeting room. The meeting was called to order at 8:03 AM by Vice-Chair David Stankes.

Vice-Chair made opening comments.

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

Attendance:

- 19 total participants
- 14 Members
- 5 guests

As this was the first meeting of the WG, a quorum was established.

### WG Meeting Agenda

1. Welcome & chair's remarks
2. Introduction of attendees
3. Approval of agenda
4. Approval of TF minutes from Fall 2021 virtual meeting
5. Call for essential Patents & IEEE SA Copyright Policy review
6. PAR status
7. Review of IEEE C57.94 sections and future assignments
8. Meeting Adjournment

The agenda was approved unanimously without discussion. Motion: Colby Second: Ken

The TF Meeting minutes of the virtual Fall 2021 Meeting were approved unanimously without discussion. Motion: Roger Second: Joe

The vice-chair presented the information on Patent Disclosures and asked the group to report any relevant patent issues – None were communicated.

**New Business:**

- **PAR Status**  
PAR was approved in Feb 2022. Last revision was in 2015 and is in really good shape.
- **New Chair**  
The Chair has stepped down and Ken Klein agreed to take over the position as chair and he will lead the next meeting.
- **TF for review**  
Vice chair is asking for volunteers to review the different sections:
  - o Normative references: Roger
  - o Definitions: Tim-Felix
  - o Application: Colby & Chris
  - o Installation: Dave
  - o Testing: Kerwin & Joe
  - o Operation: Casey
  - o Maintenance: Ken Klein & Kerwin

The vice chair will shar the comments from the last revision with the TF

With no further business, the meeting was adjourned, without objection, at 8:33 PM.

The WG will meet again at the Fall 2022 meeting in Charlotte (Sheraton / Le Meridien), NC USA, October 16 – 20, 2022.

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	Grand Power Systems	Member
Joseph	Tedesco	Hitachi Energy	Member
Colby	Lovins	Federal Pacific	Member
Chris	Powell	Intermountain Electronics	Member
Ken	McKinney	UL	Member
Jeremy	Johnson	Intermountain Electronics	Member
Tim	Holdway	Dogwood marketing	Guest
Michael	Sharp	Trench LTP	Guest
Solomon	Chiang	TGC	Member
Zaman	Malia	IEEE SA	Guest
Eduardo	Gomez	Siemens Energy	Member
Roger	Wicks	DuPont	Member

Kerwin	Stretch	Siemens Energy	Member
Klaus	Pointer	Trench Austria	Guest
Manish	Saraf	Hamond Power	Member
Sergio	Hernandez	Hamond Power	Member

**D.2.8 Revision of IEEE C57.96****Chair Aniruddha Narawane**

- Meeting called to order 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 8 of 16 members present.
  - A small number of attendees stated that they had requested membership in the previous meeting but were not shown in the membership roster. The Secretary will investigate this discrepancy and correct any errors.
  - It was noted that a few members have communicated that they will no longer be able to participate.
- The chair shared the WG Meeting Agenda. The agenda was approved unanimously without discussion.
- The chair shared the Meeting Minutes from the Fall 2021. The minutes were approved unanimously without discussion.
- Draft D2 was shared on screen with the membership.
- C57.12.80 was added to Section 2 Normative Reference. It was noted that additional references may need updating in this section as well. Chair requested all interested parties to submit additional references to add or update by e-mail.
- General consensus of the membership was that we will not copy text or data across standards, we will refer to them only.
- Section 4 – Overview was reviewed. Small discussions about whether to remove or keep the reference to C57.12.56-1986. Decision to keep due to the existing history created by use of this standard.
- Lengthy discussion in Section 5 – Loading Equations primarily around inconsistency of the exponents used in the hot spot temperature equations of C57.96 (variable M) versus C57.12.9 (variable N)
- A motion was made by Colby Lovins, seconded by Casey Ballard to add the following language to section 5.1, with the intent of applying it consistently throughout the document –
 

“N is the exponential value that may be different for different types of transformers. Refer to IEEE C57.12.91 for the appropriate value”

The motion was passed unanimously.

- Lengthy discussion regarding the application of the correction factor took place with the decision to table the topic, collect ideas from the members, and revisit in a future meeting.

- It was decided that it may be useful to add an official calculation tool that could be referenced in the standard and shared via an IEEE portal. Secretary will discuss this suggestion with Chuck Johnson who had already volunteered to work on the calculation program.
- Table 4 “Altitude Corrections” was highlighted as being critically important to end users. It was decided that some example calculations of how to apply this table could be included in an Annex. It was further suggested that Annex B of C57.12.01 could serve as a guidance for preparing this,
- Meeting adjourned on time at 12;15
- Next meeting: Fall 2022 – Charlotte, NC USA

**WG C57.96 - MEETING ATTENDANCE**

**Third WG Meeting – Spring 20222**  
**Tuesday, March 29, 2022**

<b>First Name</b>	<b>Last Name</b>	<b>Company</b>	<b>Role</b>
Robert	Ballard	DuPont	Member
Samson	Debass	EPRI	Member
Giovanni	Hernandez	Virginia Transformer Corp.	Member
Sergio	Hernandez	Hammond Power Solutions	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Timothy	Holdway	Retired	Guest
Jeremy	Johnson	Intermountain Electronics	Guest
Ken	Klein	Grand Power Systems	Member
Colby	Lovins	Federal Pacific	Member
Kushal	Mahajan	EATON Corporation	Guest
Tim-Felix	Mai	Siemens Energy	Member
Aniruddha	Narawane	EATON Corporation	Chair
Chris	Powell	Intermountain Electronics	Member
Manish	Saraf	Hammond Power Solutions	Member
Mike	Sharp	Trench Limited	Guest
Mike	Spurlock	Sperlock Engineering Services	Guest
Kerwin	Stretch	Siemens Energy	Secretary
Joseph	Tedesco	Hitachi Energy	Member

Muhammad Areeb	Wazir	EATON Corporation	Guest
Roger	Wicks	DuPont	Member

Chairman: Aniruddha Narawane  
Vice-Chairman: Iman Mohamed  
Secretary: Kerwin Stretch

#### **D.2.9 Revision of IEEE C57.124 Chair Tom Prevost**

Co-Chairman: Tom Prevost  
Co-Chairman: Rick Marek (absent)  
Secretary: Hemchandra Shertukde (absent)

Casey Ballard volunteered to take minutes of the meeting.

Call to order by Chair Tom Prevost 3:15pm

Members present 11 out of 21

Removed Mark Gromlovits, Jagdish Burde, Detlev Gross, and added Sergio Hernandez and Manish Saraf to membership list

Approval of the agenda motion Tim-Felix Mai and second Alex Kraedge. Approved unanimously

Approval of the minutes fall 2021 motion Tim-Felix Mai and second by Emilio Moralez-Cruz and approved unanimously

Patent slides were shown and no comments

No comments on the copyright slides

Chair covered the title scope and purpose for clarity and noted C57.113 was also open.

The introduction should be updated to reference 10pC for solid cast and 50pC for resin encapsulated and referenced to C57.12.01

Less than 5pC for sensitivity would be appropriate based on the background noise (its an installation challenge and not a metering challenge)

Do we want to include the term 'PD free' and if so what does it mean?

WG does not want to include the future R&D projects and investigations related to Paschen's Law nor the specific values for coupling capacitors

WG does not want to define the PD test during applied voltage testing

Sergio Hernandez volunteered to draw the dry-type connection diagrams using a coupling capacitor instead of the liquid filled bushing and he will share with the Chair who will then share it with the WG. They were originally developed for C57.113.

The Chair will update the introduction after the body is ready.

Meeting adjourned at 4:25pm

Next meeting: Fall 2022 – Charlotte, NC USA

#### Attendance

Name	Company	Member/Guest
Joseph Tedesco	Hitachi Energy	M
Alexander Kraetge	Omicron	M
Manish Saraf	Hammond Power Solutions	M
Sergio Hernandez Cano	Hammond Power Solutions	M
Solomon Chiang	TGC	M
Roger Wicks	Dupont	M
Dominique Bolliger	HV Technologies Inc.	M
Emilio Morales-Cruz	Qualitrol	M
Tim-Felix Mai	Siemens Energy	M
Janusz Szczechowski	MR / Germany	M
Casey Ballard	Dupont	M
Colby Lovins	Federal Pacific	G
Brian Sonnenberg	Instrument Transformers	G
Evan Knapp	Eaton Corp.	G
Michael Shannon	REA Magnet Wire	G
Ken Klein	Johnson Electric Coil	G
Jaroslav Chorzepa	ABB Inc.	G
Kerwin Stretch	Siemens Energy	G
Tim Holdway	Dogwood MKT	G
Chris Powell	Intermountain Electronics	G
Jeremy Johnson	Intermountain Electronics	G
Brad Kittnell	Con Edison NY	G
Rahul Yadav	Dupont	G

#### D.2.10 Revision of IEEE C57.12.91 Vice Chair Tim-Felix Mai

1. The Working Group met at the Hyatt Regency Denver, CO – Centennial H Conference Room. The meeting was called to order at 4:45 PM by Vice Chair Tim-Felix Mai. Chair, David Walker, was unable to attend.
2. Vice Chair made opening comments.
3. First working group meeting. 22 in attendance. 15 Requested membership
4. Introductions

Approval of Agenda: The Spring 2022 agenda was approved unanimously without discussion.

Motion: Alex Winter

Second: Sergio Hernandez Cano

Approval of Minutes: The Fall 2021 minutes were approved unanimously without discussion.

Motion: Casey Ballard

Second: Kerwin Stretch

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

- **Status of PAR at NesCOM**
  - o Par was approved prior to Spring meeting
- **Topics for Consideration in new revision (show of hands to see who is interested in working on each topic)**
  - o **Temperature rise test**
    - Update exponents used in eqns. 25, 26, 27 and 42 (based on Hammond data) (8)
    - Define “free from drafts” (2)
  - o **Load Loss for Metering phase angle correction like C57.12.90 (2)**
  - o **Add Scott-T figure to 9.3.4.3 (0)**
  - o **Impulse Test**
    - Change to match C57.12.90 (rFCCFFF waves, min-nominal-max taps) (4)
    - Change/Add to negative polarity to match IEC dry and IEEE liquid. This must be aligned with C57.12.01 and test levels must be adjusted. (11)
    - Define QC with reduced and Full like C57.12.90 section 10.4.2.1 Method 1 (10)
  - o **Short Circuit Test**  
Match with C57.12.90 (0)
  - o **Distribution and Power same / different (0)**
  - o **Environmental**  
Fire (4)/ climatic (2) / environmental (6)
  - o **AFWF Testing WF? WF/XX? (4)**
  - o **AF testing should be done with fans on or turn the fans off? (10)**
  - o **Insulation Resistance is a Routine Test for >300 kVA. Should Pass/Fail Criteria be developed (discussion and agreement that the pass/fail criteria should be in 12.01)**
  - o **Temperature Rise test cooling curve timing. It is currently open to interpretation. (7)**
  - o **Test for Solid Cast Pole Mounted Transformers (4)**
  - o **Tests for On load tap changers (6)**
  - o **Include 50 Hz testing where there are 60 Hz tests-depends on direction of C57.12.01 (11)**
  - o **Can load losses be at tested at a lower than rated current? Can a tolerance be added? (10)**

#### New Business:

- o **Safety Aspects for testing – Tim-Felix Mai discussed an issue with customer requiring a faster resistance measurement during temperature rise testing than required in the standard. The standard says “as fast as possible” Tim is not requesting a change, but to make the Working Group aware of the safety issue and to encourage manufacturers to be safe and not rush the resistance measurements.**
- o **Discussion of Partial Discharge patterns-should they be included in the standard? It was decided that the patterns should be added to the Guide. If it is added to the Guide, then a reference could be added to the C57.12.91 Standard.**

Adjournment: With no further business, the meeting was adjourned, without objection, at 5:21 PM.

The Working Group will meet again at the Fall 2022 meeting,

Chair: David Walker (not present at meeting)  
 Vice Chair: Tim-Felix Mai  
 Secretary: Rhea Montpool

At the DTS meeting Roger Wicks asked the DTS whether any of the transformer manufactures have been receiving requests regarding information on higher frequency dielectric performance as he has been receiving questions regarding material performance at higher frequencies. None of the members or guests said they have heard of such a request.

**Participation list:**

Last Name	First Name	Company	Requesting Membership
Ballard	Robert	DuPont	Yes
Chiang	Solomon	The Gund Company	No
Frye	Rich	Eaton	No
Fyrer	Bob	Dupont	No
Hernandez	Giovanni	Virginia Transformer Corp.	Yes
Hernandez Cano	Sergio	Hammond Power Solutions	Yes
Herron	John	RayTech USAS	Yes
Holdway	Tim	Dogwood Mkt	No
Johnson	Jeremy	Intermountain Electronics	No
Klein	Ken	Johnson Elec	Yes
Lovins	Colby	Federal Pacific	Yes
Mai	Tim-Felix	Siemens Energy	Yes
Montpool	Rhea	Schneider Electric	Yes
Pepe	Harry	Phenix Technologies, Inc.	No
Powell	Chris	Intermountain Electronics	Yes
Saraf	Manish	Hammond Power Solutions	Yes
Sonnenberg	Brian	Instrument Transformers, LLC	Yes
Stankes	David	3M	No
Stretch	Kerwin	Siemens Energy	Yes
Tedesco	Joseph	Hitachi Energy	Yes
Wicks	Roger	DuPont	Yes
Winter	Dr. Alexander	HIGHVOLT Pruftechnik Dresden	Yes

**D.2.11 IEEE C57.12.80 Liaison Report Tim-Felix Mai**

Reported there is no new information related to dry-type transformer in the revision of C57.12.80.

**D.3 Old Business**

**D3.1 Standards report**

Chair reported that we are in good shape regarding status of our documents, as all of the documents that are going to expire will do so far enough out that we do not need to start working on them yet.



Chair presented the standards report which will be published on the Transformer Committee website. Recommended that we get through balloting process for many of the documents that were voted on at the DTS today before picking up any new documents to work on.

#### D.4 New Business

Tim-Felix informed the DTS of new activity in IEEE P3105 Recommended Practice for Design and Integration of Solid-State Transformers in Electric Grid. Tim told the DTS that the first meeting was held only a few weeks ago if there was interest from any of our members of participating in the development of this document.

Joe Tedesco asked if we should consider working on the revision of IEEE C57.12.55 as the workload in the DTS decreases and we have more band width. Chair said that the decision to work on the document would be made by the membership by submitting a motion to this effect. Joe said at this time he was not prepared to make a motion but only wanted to make sure it stayed on the radar screen of the DTS as it is our primary enclosure standard. Chair reminded DTS that there was an earlier discussion on whether this was a document that could be worked on in conjunction with IEC or even CSA.

Dave Stankes suggested that it may be useful for TF and WG chairs to submit to the DTS Chair concise highlights that could be easily summarized during Committee Meeting DTS reviews held on Thursday.

With no further business, the meeting was adjourned at 2:40PM.

Chairman: Casey Ballard

Vice Chairman: David Walker

Secretary: David Stankes (prepared meeting minutes)

#### Attendees

First Name	Last Name	Affiliation	Member/Guest
Robert	Ballard	DuPont	Member
Solomon	Chiang	The Gund Company	Member
J. Arturo	Del Rio	Siemens Energy	Member
Sergio	Hernandez Cano	Hammond Power Solutions	Member
Holdway	Tim	Retired	Guest
Ken	Klein	Johnson Electric Coil	Member
Aleksandr	Levin	Weidmann Electrical Technology	Member
Colby	Lovins	Federal Pacific	Member
Tim-Felix	Mai	Siemens Energy	Member
Rhea	Montpool	Schneider Electric	Member
Nam Tram	Nguyen	ABB Inc.	Guest
Klaus	Pointner	Trench Austria GmbH	Member
Chris	Powell	Intermountain Electronics	Guest
Tom	Prevost	Weidmann Electrical Technology	Member
Manish	Saraf	Hammond Power Solutions	Member
Ulf	Radbrandt	Hitachi Energy	Guest
David	Stankes	3M	Member
Kerwin	Stretch	Siemens Energy	Member
Joseph	Tedesco	Hitachi Energy	Member

**Annex D**

Michael	Sharp	Trench Limited	Member
Roger	Wicks	DuPont	Member
Brian	Sonnenberg	Instrument Transformers, LLC	Guest
Rich	Frye	Eaton	Guest
Jeremy	Johnson	Intermountain Electronics	Guest
Kyle	Zemanovic	Eaton	Guest
Angela	Leigl	Eaton	Guest
Jared	Bates	Oncor Electric Delivery	Guest
Ken	McKinney	UL	Guest

## **Annex E Transformers and Reactors for HVDC Applications Subcommittee**

**March 28, 2022, 4.15 pm local time – Centennial H at the Hyatt Regency at Denver Convention Center**

**Chair:** Ulf Radbrandt (ulf.radbrandt@ieee.org)

**Vice Chair:** Les Recksiedler (absent)

**Secretary:** Klaus Pointner (klaus.pointner@ieee.org)

### **E.1 Introduction / Attendance / Approval of the Agenda / Essential Patent Issues**

There was a total of 19 persons in the meeting, 5 members and 14 guests present. 4 new requests for membership were received. Qualification for membership in the SC will be verified by the SC Chair.

Actual membership prior the Spring 2022 meeting is shown below:

<b>First Name</b>	<b>Last Name</b>	<b>Company</b>
David	Caverly	Trench Limited
Solomon	Chiang	The Gund Company
Eric	Davis	Burns & McDonnell
Evgenii	Ermakov	Hitachi Energy
Alexander	Gaun	Coil Innovation GMBH
Peter	Heinzig	Weidmann Electrical Technology
John	John	Virginia Transformer Corp.
Christoph	Ploetner	t.b.a.
Klaus	Pointner	Trench Austria GmbH
Ulf	Radbrandt	Hitachi Energy
Leslie	Recksiedler	Manitoba Hydro
Pierre	Riffon	Pierre Riffon Consultant Inc.
Michael	Sharp	Trench Limited
Rogério	Verdolin	Verdolin Solutions Inc.
Waldemar	Ziomek	PTI Transformers

Only 5 members out of 15 members were present, thus quorum was not met. Minimum required members for a quorum are 8 members. Approval of the agenda will be done per E-Mail

The agenda for this meeting, that was distributed via E-mail on March 14, 2022, was presented.

The list of all attendees of the meeting is shown here:

Role	First Name	Last Name	Company	Spring22
Member	Eric	Davis	Burns & McDonnell	x
Member	Evgenii	Ermakov	Hitachi Energy	x
Guest	Thomas	Falkenburger	Coil Innovation USA, Inc.	x
Guest	Giovanni	Hernandez	Virginia Transformer Corp.	x
Guest	Kurt	Kaineder	Siemens Energy	x
Secretary	Klaus	Pointner	Trench Austria GmbH	x
Chair	Ulf	Radbrandt	Hitachi Energy	x
Guest	Adnan	Rashid	Measurement Canada / ISED	x
Member	Michael	Sharp	Trench Limited	x
Guest	Alexander	Doutrelepoint	Siemens Energy	x
Guest	Juan	Castellanos	Prolec GE	x
Guest	Adetokunbo	Shosanya	Xcel Energy	x
Guest	Eduardo	GomezHernig	Siemens Energy	x
Guest	Onome	Avanoma	MJ Consulting	x
Guest	Jennie	Aldenlio	Hitachi Energy	x
Guest	Shankar	Nambi	Bechtel Energy Inc	x
Guest	Sebastian	Rehkopf	Maschinenfabrik Reinhausen	x
Guest	Harry	Pepe	Phenix Technologies	x
Guest	David	Burks	Xcel Energy	x

## E.2 Approval of the minutes of the November 2021 virtual meeting

As there was no quorum, approval of minutes and agenda will be done by sending an E-Mail to the members of the SC asking for approval.

## E.3 Brief report on the meeting of the Administrative SC by Ulf Radbrandt

New officers of the IEEE Transformers Committee from 2022:

- Ed teNyenhuus is new chair
- David Wallach is vice chair.
- Bill Griesacker is secretary

Otherwise no further specific information from the administrative SC. For more information, please see the general meeting MoM.

## E.4 Condition monitoring of HVDC transformers

Presentation by Evgenii Ermakov from Hitachi Energy Sweden has been held as scheduled. Handout of the presentation will be posted on the IEEE TC website under the SC HVDC section (password protected).

Discussion about efforts and planning of such site measurements. As e.g. 6 units are identical, measurements can be used a cross reference to see developing problems within a unit. Interval for such measurements have to be agreed individually, as considerable planning and efforts are imposed.

**E.5 Working Group Reports**

Currently no active working group. 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

**E.6 Further Work**

A presentation on condition monitoring for reactors (smoothing reactors and converter reactors) will be prepared for the Spring meeting 2023. Contribution by Trench and Coil Innovation. Details and scope need to be agreed.

Continue discussions about what to be included in our standards, when they will be revised, e.g. to introduce sections about condition monitoring.

**E.7 Old Business**

There was no old business

**E.8 New Business**

There is no new business

**E.9 Adjournment**

The meeting was adjourned at 5:35 pm.

## 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 37 people were in attendance.

First Name	Last Name	Affiliation	Role
Mubarack	Abbas	Siemens Energy	Guest
Jeffrey	Britton	Doble	Guest
Deniss	Carr (Villagran)	GE Grid Solutions	Member
Jaroslav	Chorzepa	ABB Inc.	Member
Michael	Craven	Qualus Power Services	Guest
Herton	de Oliveira Filho	PSEG&M	Guest
Sami	Debass	Electric Power Research Institute (EPRI)	Guest
Rolando	Demes	Arteche	Member
Huan	Dinh	Hitachi Energy	Member
John	Eastman	ZTZ Services	Guest
Eric	Euvrard	RHM International	Member
Reto	Fausch	RF Solutions	Guest
Dora	Gazivoda	KONCAR - Instrument Transformers	Guest
John	Herron	Raytech USA	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Marek	Kornowski	Polycast International	Member
John	Kutula	Dominon Energy	Guest
Colby	Lovins	Federal Pacific	Guest
Lee	Matthews	Howard Industries	Guest
James	McBride	JMX Services, Inc.	Guest
Daniel	Mulkey	Mulkey Engineering Inc.	Guest
Stephen	Oakes	WEG Transformers USA Inc.	Member
jonas	oliveira	Hitachi Energy	Guest
Adnan	Rashid	Measurement Canada / ISED	Member
Benjamin	Riggins	Xcel Energy	Guest
Diego	Robalino	Megger	Member

Zoltan	Roman	GE Grid Solutions	Member
Thomas	Sizemore	ABB Inc.	Member
Steven	Snyder	Hitachi Energy	Member
Muhammad Abdullah	Sohail	Trench Group	Guest
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Mauricio	Soto	Hitachi Energy	Guest
Risto	Trifunoski	Trench Limited	Member
Barrett	Wimberly	GE Grid Solutions	Member
Mana	Yazdani	Trench Limited	Member
Igor	Ziger	KONCAR - Instrument Transformers	Member

## F.2 Quorum

18 of 46 members were present and quorum was not attained. 19 guests were also in attendance. The total number of attendees was 37 and 7 requested memberships in the ITSC. These requests for membership will be reviewed.

## F.3 Agenda

An agenda was displayed by the chair. While no objections were noted to the agenda it was not approved due to the lack of a quorum.

## F.4 Approval of minutes – Fall 2021 meeting

Minutes were not approved as there was no quorum.

## 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

**Attendees:** 26 people attended the meeting with 18 members present. Quorum was met.

The table below shows all recorded attendees and affiliations at the time of the meeting.

<b>Last Name</b>	<b>First Name</b>	<b>Affiliation</b>
Bigham	Lee	Instrument Transformer Equip Corp
Brannen	Randy	Southern Company Services
Burk	David	Xcel Energy
Craven	Michael	Phoenix Engineering Services
Davis	Eric	
Demes	Rolando	Arteche
Dinh	Huan	Hitachi Energy
Dolloff	Paul	East Kentucky Power
Fausch	Reto	RF Solutions
Gazivoda	Dora	KONCAR - Instrument Transformers
kaineder	kurt	Siemens Energy
Konta	Ivan	KONCAR - Instrument Transformers
Kotula	John	Dominion Energy
Leal	Gustavo	Dominion Energy
Matthews	Lee	Howard Industries
McBride	James	JMX Services, Inc.
Oakes	Stephen	WEG Transformers USA Inc.
Oliveria	Jonas	Hitachi Energy
Rashid	Adnan	Measurement Canada / ISED
Riggins	Benjamin	Xcel Energy
Roman	Zoltan	GE Grid Solutions
Roussell	Marnie	Entergy
sohail	Muhamad	Trench Ltd.
Sizemore	Thomas	ABB Inc.
Skinger	Kenneth	Scituoto Consulting
Snyder	Steven	Hitachi Energy
Sonnenberg	Brian	Instrument Transformers, LLC



Trifunoski	Risto	Trench Limited
Carr	Deniss	GE Grid Solutions
Wimberly	Barrett	GE Grid Solutions
Yazdani	Mana	Trench Limited
Ziger	Igor	KONCAR - Instrument Transformers

**Essential Patent Claims:** Was discussed by the Chair. The membership was inquired as to if anyone knew of essential patent claims. None were brought up.

**IEEE Copyright Policy:** Was discussed by the Chair.

**Agenda:** The agenda was displayed by the Chair. Steven Oakes made a motion to approve the minutes and Kenneth Skinger seconded the motion. The agenda was approved with no objections made.

**Minutes:** Minutes of the Fall 2021 Virtual meeting were presented. Tom Sizemore made a motion to accept the minutes and Igor Ziger seconded the motion. The minutes were approved by the members of the working group with no objections.

David Wallace presented the latest status of the draft and laid out the timeline for the next steps. These steps consisted of:

- Complete CD3 comment review & resolution of related issues: done
- TC38 review of comments: April 13
- Submit resolved comments to IEC Central Office for circulation to National Committees: April 20
- Vote in IEEE WG & SC for Sponsor Ballot: April 27
- Submit draft to IEEE for editorial review: April 30
- IEEE ballot invitation: May 18
- Submit draft to IEC for CDV: May 18
- IEEE Ballot initiation: May 25

David Wallace agreed to post the latest revision of the draft to the Transformer Committee Website and send an emailed copy to the work group.

Huan Dinh made a motion to adjourn the meeting, Barrett Wimberly seconded the motion. No objections were made.

The meeting was adjourned at 8:40 am.

**Next Meeting:** The WG will meet at the Fall 2022 meeting in Charlotte, NC.

## F.7.2.3 Working Group Instrument Transformer Requirements C57.13 – David Wallace

**Attendees:** The number of participants was 37. 32 people requested membership. The attendees, affiliations and if they requested membership is listed below.

First Name	Last Name	Affiliation	Role/Membership request
Lee	Bigham	Instrument Transformer Equip Corp	Yes
Randy	Brannen	Southern Company Services	Yes
Jeffery	Britton	Phenix Tech. Division of Doble Engineering	Yes
Deniss	Carr	GE Grid Solutions	Yes
Jaroslav	Chorzepa	ABB Inc.	Yes
Michael	Craven	Phoenix Engineering Services	No
Juan Carlos	Cruz Valdez	Prolec GE	Yes
Rolando	Demes	Arteche	Yes
Maggi	DeMillon	Trench Limited	Yes
Huan	Dinh	Hitachi Energy	Yes
Eric	Euvrard	RHM International	Yes
Reto	Fausch	RF-Solutions	No
Dora	Gazivoda	KONCAR - Instrument Transformers	Yes
Ryan	Hogg	Bureau of Reclamation	Yes
Evan	Knepp	Eaton Corp.	Yes
Ivan	Konta	KONCAR - Instrument Transformers	Yes
John	Kotula	Dominion Energy	Yes
James	McBride	JMX Services, Inc.	Yes
Robert	Middleton	RHM International	Yes
William	Munn	Southern Company Services	No
Stephen	Oakes	WEG Transformers USA Inc.	Yes
Jonas	Oliveira	Hitachi Energy	Yes
Harry	Pepe	Phenix Technologies	No
Adnan	Rashid	Measurement Canada / ISED	Yes
Diego	Robalino	Megger	Yes
Zoltan	Roman	GE Grid Solutions	Yes
Thomas	Sizemore	ABB Inc.	Vice - Chair
Steven	Snyder	Hitachi Energy	Yes
Muhammad Abdullah	Sohail	Trench Limited	Yes
Brian	Sonnenberg	Instrument Transformers, LLC	Yes
Charles	Sweetster	OMICRON electronics Corp USA	Yes
Risto	Trifunoski	Trench Limited	Yes
Robert	van Tol	Commonwealth Associates	No

David	Wallace	Mississippi State University	Chair
Barrett	Wimberly	GE Grid Solutions	Yes
Mana	Yazdani	Trench Limited	Yes
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

### **WG Scope and purpose**

The text was displayed by D. Wallace and briefly discussed

### **Action items – some action items were brought forward by the chair**

- The absorption of the mA standard IEEE C57.13.7
- Incorporation of outputs from accuracy TF
- The current document (“Draft zero”) will be circulated among the WG body along with a comment sheet to initiate comments, changes and hot topics. Some of these may result in dedicated TFs

### **The floor was opened for different topics to be brought forward**

- Altitude rating was brought forward by R. Hogg. Some discussion was initiated and some comments point out to more concurrent standards such as the SSVT standard and the new CDV of IEC 61869-1
- J. Kotula brought forward failures due to switching transients as an item that needs to be addressed. This was added on by performance in vicinity of renewables. Z. Roman added to this topic with the intent to bring in the results by the Cigre WG on this topic
- Z. Roman brought up harmonic measurements, which was a point also commented by J. Kotula and I. Ziger. IEC was again mentioned as a source of reference
- R. Hogg brought up alternative dielectric gasses and liquids
- I. Ziger brought up that it is a good time to look at IEC 61869-1 for some contributions and good practices as the standard is in the final stages of completion. The same was confirmed by Z. Roman, who did the same in the CCVT WG.

- I. Ziger brought up the inclusion of gapped cores from C57.13.5 and C57.13.2
- Z. Roman brought up ferroresonance and I. Ziger pointed out to GOST standard as a good practice

**Next Meeting:** This WG will meet to continue work at the Charlotte, NC USA, Fall 2022 meeting.

### F.7.5 TF for Instrument Transformers Accuracy – Igor Ziger

**Attendees:** The number of participants was 39. 19 members present and quorum was obtained. Paper rosters / sign-in sheets were circulated. 5 people requested membership. All fulfill the minimal requirements. 1 member asked to be removed from the member list. The table below shows all recorded attendees, affiliations at the time of the meeting and roles in this task force.

First Name	Last Name	Affiliation	Role
Mubarate	Abbas	Siemens Energy	Guest
Lee	Bigham	Instrument Transformer Equip Corp	Member
Randy	Brannen	Southern Company Services	Member
Jaroslav	Chorzepa	ABB Inc.	Guest
Michael	Craven	Phoenix Engineering Services	Guest
Herton	de Oliveira Filho	PSEG	Guest
Samson	Debass	EPRI	Guest
Rolando	Demes	Arteche	Guest
Jonathan	Deverick	Dominion Energy	Guest
Huan	Dinh	Hitachi Energy	Member
Eric	Euvrard	RHM International	Member
Dora	Gazivoda	KONCAR - Instrument Transformers	Guest
Ryan	Hogg	Bureau of Reclamation	Guest
Ivan	Konta	KONCAR - Instrument Transformers	Member
Marek	Kornowski	Polycast International	Member
John	Kotula	Dominion Energy	Guest
Colby	Lovins	Federal Pacific	Member
James	McBride	JMX Services, Inc.	Guest
Robert	Middleton	RHM International	Member
William	Munn	Southern Company Services	Guest
Stephen	Oakes	WEG Transformers USA Inc.	Guest
Jonas	Oliveira	Hitachi Energy	Guest
Tihomir	Pandža	Siemens Energy	Guest
Goran	Plišić	Siemens Energy	Guest

Adnan	Rashid	Measurement Canada / ISED	Member
Diego	Robalino	Megger	Member
Zoltan	Roman	GE Grid Solutions	Member
Thomas	Sizemore	ABB Inc.	Member
Muhammad Abdullah	Sohail	Trench Limited	Guest
Brian	Sonnenberg	Instrument Transformers, LLC	Member
Charles	Sweetster	OMICRON electronics Corp USA	Guest
Risto	Trifunoski	Trench Limited	Member
Deniss	Villagran	GE Grid Solutions	Member
David	Wallace	Mississippi State University	Member
Barrett	Wimberly	GE Grid Solutions	Guest
Mana	Yazdani	Trench Limited	Member
Peter	Zhao	Hydro One	Guest
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 Marek Kornowski and seconded by David Wallace.

**Agenda:** Unanimously approved with motion brought forward by Zoltan Roman and seconded by Lee Bigham.

### **Review of the action items for this task force:**

#### **Review of the action items for this task force:**

##### **Change of TF “status”**

- It was brought forward by I. Ziger and T. Sizemore that the TF will report to the newly formed C57.13 revision working group instead of the Instrument Transformer Subcommittee directly.
- There was a short discussion initiated by Z. Roman on what the output of the TF was. It was conducted that Annex A, extended range and other spillovers from the main standard will be handled by the taskforce. Further conversation will take place in the ITSC meeting.

### **2 Presentations of the results based on application of methodology from “Annex A” to different unit types**

- **The 1<sup>st</sup> was held by B. Sonnenberg**
- The application of the method was showcased on units ranging 600 V– 69 kV
- A very good correlation of results was observed

- The approach was based on measurements made at 0 VA and maximum burden
- Z. Roman commented that other power factors should be considered. However, only standard burdens were able to be used in this case
- It was noted that used 0 VA values were actually very close to “true” 0 VA.

**- The 2<sup>nd</sup> was held by H. Dinh**

- The application of the method was showcased on two units (69 kV single ratio and 115 kV dual ratio) with different power factors
- Again, a good correlation was observed. It was pointed out that a better result certainty was achieved when Maximum and 0 burdens are used in the method.
- Z. Roman pointed out whether theoretical or actual burdens were used. A small discussion ensued on the topic, with T. Sizemore pointing out that it is critical to accurately assess the 0 burden as the failure to do so can lead to some errors
- J. Oliveira pointed out that the differences in presented results are negligible for practical applications

**The results of the planned 3<sup>rd</sup> presentation by Z. Roman will be distributed to the WG after they are received.**

**I. Ziger asked for volunteers to work on the Annex A and implementing the changes in the main text of the standard.** Several people volunteered directly (R. Trifunoski, M. Kornowski, H. Dinh, Z. Roman, D. Wallace). This group of people will be contacted after the meeting to perform the work on the annex and main text implementation.

**Presentation of experiences on CTs with extended range – held by T. Sizemore**

- A presentation was given with basic concerns on extended range, laboratory and field implications, as well as approaches to take when implementing it in the standard
- A very fruitful discussion ensued. The main points (and contributors) are listed below:
- It is important to give explanatory text which explains extended range and its implications (more expensive, different materials....) - M. Kornowski, T. Sizemore, R. Trifunoski
- It is necessary to put an additional clause for extended range – D. Wallace
- Extended range does not apply to Multi Ratio units – J. Oliveira
- Some customers cannot “afford” RF 4.0 due to meter limitations – L. Bigham
- Some meters see very low currents as noise. It is a question of what meters can actually sense – J. Kotula
- A question of test system calibration and traceability – B. Wimberly
- It will be important to clearly indicate the extended range on the nameplate – R. Hogg
- Two ideas were brought forward on how to do that. The first is to define extended range classes (Z. Roman). The other is to specify the range the accuracy is

applicable to – either in percentage or amps of primary current (L. Bigham, I. Ziger, J. Kotula)

- We have to carefully specify expected accuracy. It is a question how to address the “double” accuracy limits for class 0.15. (I. Ziger). R. Trifunoski suggested that “double” accuracy limits should be removed from extended range applications
- Some other minor comments and observations were brought forward regarding field testing, available equipment and calibration

**I.Ziger asked for volunteers to work on the wording for extended range. The first step is the explanatory text, and based on that the final approach will be determined .** Several people volunteered directly (A. Rashid, R. Trifunoski, M. Kornowski, J. Oliveira, J. Chorzepa, T. Sizemore, H. Dinh, Z. Roman). This group of people will be contacted after the meeting to perform the work on the wording regarding extended range CTs.

**Motion to adjourn:** A motion was put forth by Zoltan Roman and seconded by Marek Kornowski

**Next Meeting:** This WG will meet to continue work at the Charlotte, NC, USA, Fall 2022 meeting.

## F.8 Old Business

No old business was displayed or discussed.

## F.9 New Business

Zoltan Roman presented an update on the C57.13.9 standard, no working group meeting was held. The ITSC had previously approved moving this standard into the balloting stage. Draft 16 was created and on 3/21 PSCC approved it. The draft was circulated and 20 people voted, 18 approved, 2 abstained. 13 people volunteered to be part of the ballot resolution group. The ITSC membership will be surveyed for approval to go to the balloting stage. If approved the plan is by 4/15, the ballot will be sent out for balloting. 30 days will be provided for comments. The 1<sup>st</sup> comment resolution is targeted to completed by the end of May.

Thomas Sizemore provided a brief update for the document being developed in China. “Guide for live line calibrator of current transformer in distribution networks”. A chair for this effort has been selected and meetings will start soon. Periodic updates will be provided to the ITSC. Zoltan Roman questioned the why we have line calibration. Ryan Hogg discussed the use of NERC for continuous monitoring.

A question had been posed to Thomas Sizemore between meetings regarding creation of a sensor device standard. This subject was discussed primarily to gauge the level of interest in the membership. Zoltan Roman expressed hesitancy to cover these devices under the ITSC. Jeff Britton and Jim McBride summarized related work being done by

PSIM regarding accuracy measurement of sensor under various conditions. PSIM primarily deals with measurement methods not device standards and thus in the opinion of Jeff and Jim PSIM would not look to lead such an effort. It was indicated that PSIM would likely be willing to provide significant input into the accuracy sections of a device standard should another part of IEEE take up the effort to develop such a standard. Jim indicated that he would consider if this topic could be taken to the Technical Council who may have input as to who should work on such a standard.

#### **F.10 ITSC Adjournment**

The meeting concluded and was adjourned at approximately 9 AM.

The next meeting is to be held in Charlotte, North Carolina, USA, in the Fall of 2022.



## Annex G Insulating Fluids Subcommittee

March 30, 2022

Denver Colorado - Hyatt Regency Room Centennial F-G

Chair: Scott Reed

Vice-Chair: Jerry Murphy (not present)

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 13, 2022- 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 28<sup>th</sup>, 2022).

#### 1.2 Roll Call of SC members: (Quorum requirement: 23 minimum)

- a. 18 Members signed in, from a total of 44 members. Quorum was not achieved.
- b. Total of 60 attendees. 26 Guests and 16 new attendees, and 14 requested membership, whose eligibility will be verified.
- c. Registered Attendance:

First Name	Last Name	Role			
Juan	Acosta	Guest	Kurt	Kainerder	Member
Jennie	Aldenlid	Guest	Zan	Kiparizoski	Member
Jared	Bates	Guest	John	Kotula	Guest
Jean-Noel	Berube	Guest	Angela	Leigl	Guest
Kevin	Biggie	Guest	Tiffany	Lucas, P.E.	Guest
William	Boettger	Member	Jinesh	Malde	Member
Joshua	Bohrn	Guest	Brady	Nesvold	Guest
Jeremiah	Bradshaw	Guest	Ashmita	Niroula	Member
David	Calitz	Member	Jonas	Oliveira	Guest
Juan Alfredo	Carrizales	Guest	Dwight	Parkinson	Member
Juan	Castellanos	Member	Matt	Pinard	Guest
Stuart	Chambers	Member	Daniel	Posadas	Guest
Jonathan	Cheatham	Guest	Thomas	Prevost	Member
Larry	Christodoulou	Member	John	Pruente	Guest
Olivia	Cordova	Guest	Scott	Reed	Chair
Michael	Dahlke	Guest	Sebastian	Rehkopf	Guest
Stephanie	Denzer	Member	Benjamin	Riggins	Guest
Zachary	Draper	Guest	Diego	Robalino	Guest
Florin	Faur	Guest	Mickel	Saad	Member
Sanford	Fong	Guest	William	Salmon	Guest
Bruce	Forsyth	Guest	Alan	Sbravati	Secretary
Rainer	Frotscher	Member	Samuel	Sharpless	Guest
Alex	Gilliver	Guest	Jonathan	Sinclair	Guest
Orlando	Giraldo	Guest	Brian	Sparling	Guest
Niklas	Gustafsson	Guest	Markus	Stanks	Guest
Karl	Jakob	Guest	Gregory	Steeves	Member
			Ryan	Thompson	Guest

Mark	Tostrud	Guest	Christopher	Whitten	Guest
Alwyn	Van Der Walt	Guest	Deanna	Woods	Member
Evanne	Wang	Guest	Malia	Zaman	Guest
William	Whitehead	Guest			

### 1.3 Agenda Approval:

- a. Since quorum was not achieved, it was not possible to have a motion for approval.

### 1.4 Approval of minutes from the F21 meeting (virtual):

- a. Since quorum was not achieved, it was not possible to have a motion for approval.

### 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 expires in December 2022, and the first balloting is expected to happen in Feb/22. 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. C57.637, C57.130, C57.139 will expire in 2025.
- d. C57.146 has a new chair, Paul Boman.
- e. C57.130 has a new chair, Bruce Forsyth.
- f. C57.104 did not meet this time.
- g. C57.146, C57.155, C57.637 and C57.166 have active PAR's.

## 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. The WG meeting had 24 of 41 members were present so a quorum was achieved.
- b. Call for patents was presented without any claim.
- c. Five Task Forces chairs each gave a status report of their respective sections.
- d. TF1, with Jinesh Malde, already completed their draft and shared with TF6.
- e. TF2 is with Scott Reed. Draft was shared with the group in Jan/22 and discussed during this meeting.
- f. TF3 is with Alan Sbravati. Work is completed, and already shared with TF6.
- g. TF5 is with Rainer Frotscher. The document is already completed and shared with TF6.
- h. TF6 is with Toby Johnson, who is starting to edit the document.
- i. The expectation is to have the guided balloted at the F22 meeting.

See *Appendix I* for the S22 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 (PAR Expiration extended to Dec 2024)**

2.1.2.1 WG Chair: Paul Boman

- a. Attendance total 34, members 9 out of 22, guest 22 and 4 requested membership. Quorum was not achieved.
- b. No patent claim was presented.
- c. Fall 2021 Working Group Minutes was not voted on because a quorum was not present. Planning to use an electronic ballot to approve all unapproved Meeting Minutes.
- d. Chair gave timeline of Guide progress with the Guide expiration at the end of 2021, a PAR extension was given to 2024
- e. Data review – 5 sources of data were provided along with the CIGRÉ data. The CIGRÉ data was limited to 25 transformers and was very different from the other 5 sources.
- f. A request for sharing more case studies was presented by the chair, which must be also include a copyright release form.

See *Appendix II* for the S22 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.

See *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 Denzer

- a. The Working Group (WG) has 54 members with 17 (32%) were present. Quorum not achieved.
- b. Jon Karas has left IEEE and we have removed him from the membership list effective today. This would make the current membership number 53. We had 15 guests attend the meeting, and 10 have requested membership.
- c. Call for patents was presented, without claims. Copyright slides were presented.
- d. The four task forces presented the status of their work. A fifth task force will edit the final document.
- e. The working group is requesting more volunteers for the task forces.

See *Appendix IV* for the S22 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 12 of 24 members present during the meeting. Quorum was not achieved when verified during the meeting.
- b. No patent claims were presented. Copyright slides were presented.
- c. Main discussion for this meeting was the progress of TF1, on collecting the DGA data.
- d. Two presentations were made, by Zach Draper and Lance Lewand
- e. Meeting was adjourned.

See *Appendix V* for the S22 Minutes (unapproved) of C57.155 WG Meeting as submitted.

## **2.1.6 Task Force C57.139 – Guide for the Interpretation of Gases generated in Liquid Type Load Tap Changers**

### **2.1.6.1 TF Chair: Rainer Frotscher**

- a. Th Total attendance record: 33, members: 7, Guests: 26, with 11 attendees requesting membership.
- b. Established Quorum, 7 members were present out of 13 members in total
- c. Call for essential patent Claims: Ed teNyenhuis stated there was one LOA from 2013 by Reinhausen Germany.
- d. Copyright Policy was discussed.
- e. Introduction of WG Officers
- f. PAR was reviewed, as approved by NesCom, with expiration in December 2026. All work incl. Ballot should be done by end of 2025.
- g. The chair presented his vision for the guide, bringing the statistical analysis and the section on Duval triangles to the normative portion, adding sections around the limitations and validation of the DGA's, and topical format as much as possible aligned with C57.104.

See *Appendix VI* for the S22 Minutes (unapproved) of C57.139 TF 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. There were 72 participants present and 50 participants requested voting membership. Since this was the first meeting of the Working Group, voting membership was automatically granted to those who checked the Membership Request box in the attendance roster
- b. Call for essential patent Claims: no claims presented.
- c. Copyright Policy was presented / no comments.
- d. Review of the agenda
- e. PAR was reviewed, as approved by NesCom.
- f. The group decided in favor of modifying the approved PAR for including ester liquids in the scope of this standard. A Task Force led by Lance Lewand will work on this topic.
- g. Another discussion was raised around the inclusion of limits of gas generation during overload tests and other dielectric tests.

See *Appendix VII* for the S22 Minutes (unapproved) of C57.130 WG Meeting as submitted.

## **3 Old Business**

- a. Migration of TF2 previously associated with WG C57.154 from ILSC to IFSC  
As the working group activities are closed, for the standard is already completing the balloting process, and the task force did not reach a conclusion, the group requested keeping the activities. It was agreed during this meeting that the current chair of the task force will consult with the members for stablishing a new Task Force under the IFSC. This groups will focus on preparing a positioning paper for the testing procedure and continuous operating temperature of ester liquids in transformer

## **4 New Business**

- a. No new business.

## **5 Next IFSC Meeting:**

October 19th, 2022 – Charlotte, NC

## **6 Adjournment**

A motion for the meeting to be adjourned was presented by Claude Beauchemin and seconded by Ed Casserly.

The subcommittee adjourned at 3:32 p.m.

Respectively Submitted, Alan Sbravati, Secretary IFSC

*Unapproved Minutes from the F21 IFSC WG and TF meetings*

*Appendix I*

**Working Group for Acceptance and Maintenance of Insulting Liquids  
PC57.166**

**Tuesday, March 29, 2022**

**1:45 – 3:00 PM**

**Hyatt Regency Denver – Room Centennial F**

Chairman Tom Prevost

Vice Chair Scott Reed

Secretary Alan Sbravati

The meeting was called to order at 1:49 pm by the Chair.

There were 24 of 41 members present. Total of 53 attendees, including 29 guests. A membership quorum was achieved.

Attendance list:

Juan Acosta	Guest	Dominic Pollaro	Guest
Elise Arnold	Guest	Thomas Prevost	Chair
Jeff Benach	Guest	John Prunte	Guest
Dominique Bolliger, Ph.D.	Member	Scott Reed	Vice-Chair
Paul Boman	Member	Rerry Reeder	Guest
Mike Bonn	Member	Sebastian Rehkopf	Guest
Jeremiah Bradshaw	Member	Diego Robalino	Member
Stuart Chambers	Member	Zoltan Roman	Guest
Larry Christodoulou	Guest	Mickel Saad	Member
Olivia Cordova	Guest	Alan Sbravati	Secretary
Stephanie Denzer	Member	Pugal Selvaraj	Member
Zachary Draper	Guest	Jonathan Sinclair	Member
Rainer Frotscher	Member	Brian Sparling	Guest
Lorne Gara	Guest	Thomas Spitzer	Guest
Robert Harper	Member	Gregory Steeves	Member
Andrew Holden	Member	Dean Summer	Guest
Miller Kent	Guest	Phil Swan	Guest
Zan Kiparizoski	Member	Troy Tanaka	Guest
Michelle Kutzleb	Guest	Risto Trifunski	Guest
Aleksandr Levin	Guest	Alwyn Van Der Walt	Member
Lance Lewand	Guest	Evanne Wang	Member
Tiffany Lucas, P.E.	Guest	Leon White	Guest
Jinesh Malde	Member	William Whitehead	Guest
Kumar Mani	Member	Christopher Whitten	Guest
Brian McBride	Member	Roger Wicks	Guest
Ashmita Niroula	Guest	Malia Zaman	Guest
Parminder Panesar	Member		

Introductions

Approval of Agenda

- Motion for approving agenda presented by Diego Robalino and second by Kumar Mani

Approval of Fall 2021 Minutes

F21 minutes approval

- Motion for approving the minutes presented by Stephanie Denzer and second Jeremiah Bradshaw

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 presented scope and purpose of the standard for a refreshing

- The group identified the need of removing the references to reclaim and reconditioning from the scope
- PAR needs to be updated accordingly

Chair presented the current version of the standard.

Presentations of the task force activities

TF 1 – Jinesh Malde

- The draft was completed and shared with Toby Johnson. No pending topics.

TF 2 – Scott Reed

- Draft of the session was shared with the group in January. Received comments will be discussed during this meeting.

TF 3 – Alan Sbravati

- The draft was completed and shared with Toby Johnson. No pending topics.

TF 5 – Rainer Frotscher

- The draft was completed and shared with Toby Johnson. No pending topics.

TF 6 – Toby Johnson

- No status was presented.

Next topic was the comments presented by Rainer Frotscher.

In the draft sent in Jan, the tables listing limits for the fluids' properties were separated according to the liquid type. Rainer did a proposal merging all liquids in a single table.

He also proposed to change the term used for the classification of the fluids from “class I, II and II” to “state I, II, III”. During the discussions additional suggestions were presented, such as “status” and “condition”

After the discussions, Jinesh Malde presented a motion for using the term “condition”. He was seconded by Michael Saad.

Several attendees supported the use of that terminology.

On top of that Rainer also proposed adding the words “Good”, “Fair” and “Poor” for conditions 1, 2 and 3. This was discussed and not supported by the group. Several attendees were against this suggestion. Since it was not part of the presented motion, it was dismissed.

Regarding the presented motion, 21 members voting for approval and there was one abstention.

Motion carries. Instead of Class the new term is Condition.

Next Rainer presented his version of the table, combining the fluids in a single table.

Group highlighted there was some missing values, marked with question marks. There were several discussions around the inclusion of values of IFT for ester fluids, the limits of DDF at 25°C and 100°C, and more, which were considered followed by the task force chair. Scott Reed will work on the draft and share a new version.

Tom Prevost informed the attendees that the drafts will be posted drafts in the WG website, under the task forces.

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 28th, 2022  
11:00 AM to 12:00 PM (MDT)  
Hyatt Regency Denver Colorado  
Minutes of Working Group Meeting**

Chair Paul Boman / Vice Chair Lance Lewand  
Secretary vacant

Attendance total 34, members 9, guest 22 and 4 requested membership but need to attend in the Fall 2022. The WG has 22 Members, so a WG quorum was not present, so no business was conducted. At the Fall 2022 meeting, 14-members will be removed for non-participation.

#### **S22 Meeting Attendance at end of meeting**

Role	First Name	Last Name
Chair	Paul	Boman
Committee Member	Eric	Davis
Committee Member	Stephanie	Denzer
Interested Individual	Zachary	Draper
Active Participant	Florin	Faur
Active Participant	John	Pruente
Committee Member	Scott	Reed
Guest	Jeff	Benach
Guest	Juan	Castellanos
Interested Individual	Larry	Christodoulou
Guest	George	Frimpong
Guest	Rainer	Frotscher
Guest	Axel	Kraemer
Interested Individual	Michelle	Kutzleb
Guest	Hali	Moleski
Guest	Arturo	Nunez
Guest	Mauricio	Soto
Guest	Bill	Whitehead
Vice-Chair	Lance	Leward
Interested Individual	Phil	Hopkinson
Guest	Chao	Li
Guest	Jebashan	Rehhopl
Guest	Andy	Downey
Guest	Tiffany	Lucons
Guest	Arwyn	Vanderwalt
Guest	Lorne	Gara
Guest	Jonathan	Sinclair
Guest	Sanford	Fong
Guest	Mickel	Saad

Guest	Wes	Schrom
Guest	Evanne	Wang
Guest	Stephanie	Denzer
Member	John	Pruente
Guest	Christopher	Whitten

\*Requested Membership

Call for essential patents – none at this time

Copyright usage was discussed during the meeting

Agenda – no additions were made to the agenda. Motion made Zach Draper to accept the Agenda and seconded by John Pruente

Fall 2021 Working Group Minutes was not voted on because a quorum was not present. Planning to use an electronic ballot to approve all unapproved Meeting Minutes.

Copyright discussed – no copyright releases were discussed for the citation papers in the document

Data review – 5 sources of data were provided along with the CIGRÉ data. The CIGRÉ data was limited to 25 transformers and was very different from the other 5 sources. The type of transformers (traction, power, distribution, etc.) involved in the original data collection was unknown. Planning to use an electronic ballot to select an appropriate data set for threshold values. Phil Hopkinson stated that true distribution transformers have a sealed preservation system with dry air while power transformers will have a dry nitrogen gas blanket.

There was some discussion at what temperature the gases are formed in silicone and also related to the oxygen concentrations. Phil Hopkinson discussed core lamination issues which would influence the production of gases in all liquid filled transformers.

Case Studies – There was a request from Paul Boman that more case studies were needed for the document. If case studies are submitted, they need to be on company letterhead and provide a copyright release. The form for the copyright release can be found on the Transformer committee's website.

Paul Boman will issue electronic vote on data sets in regard to how to use the data. Paul will discuss with Claude to get information on the different data sources. There was also some discussion on data statistics but on a very cursory level. There was a comment that IEEE no longer has access to the individual data from source 5. Discussion of the data as whether or not the original data contained information on manufactures, geographical locations of transformer installations and other items that might help to qualify the data. It was explained that the names of manufacturers could not be used as per IEEE regulations and there was no way to know where the geographic locations were.

There was additional discussion on harmonizing sections in this guide in relation to C57.104 that can be harmonized. Lance Lewand suggested not to use the rate calculations from C57.104 because it is so complex and the amount of data available may not be able to provide those calculations anyway. Paul would like to see information on actions to take after threshold values have been reached such as confirmation and surveillance samples.

Adjourned Meeting

### *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 29, 2022  
9:30 AM – 10:45 AM (mountain time)  
Hyatt Regency Denver Colorado**

#### **Minutes of Working Group Meeting**

The meeting was called to order at 9:30 am by Chair Stephanie Denzer. Scott Reed (Vice-Chair) and Andy Holden (Secretary) were also present.

Attendees:

The Working Group (WG) has 54 members with 17 (32%) were present.

Present

1. Alan Sbravati
2. Andy Holden
3. Ashmita Niroula
4. Christopher Whitten
5. Ed teNyenhuis
6. Greg Steeves
7. Jeremiah Bradshaw
8. Jinesh Malde
9. John Prunte
10. Jonathan Sinclair
11. Kevin Biggie
12. Larry Christodoulou
13. Mickel Saad
14. Paul Boman
15. Robert Harper
16. Scott Reed
17. Stephanie Denzer

Jon Karas has left IEEE and we have removed him from the membership list effective today. This would make the current membership number 53.

We had 15 guests attend the meeting, and 10 have requested membership.

Due to the time constraints, attendees did not introduce themselves.

## Agenda

- 1) Introduction
- 2) Review Copyright Notification
- 3) Review Call for Patents
- 4) Review Membership
- 5) Introduction of Task Force leaders and updates

## Chair's Remarks:

Chairwoman Denzer (SD) requested a call for patents and no claims were made. Lance Lewand (guest) did ask for clarification about the patent policy, and it was provided by Tom Prevost (guest), Ed teNyenhuis (member), and Stephanie Denzer (chair).

Next, the Chair reviewed with the Task Force (TF) the IEEE's copyright policy, of which no comments were made.

The Chair commented that first meeting (Spring 2021) was focused on clarifying the purpose and scope of the WG. The second meeting (Fall 2021) was focused on sectionalizing the document and enlisting Task Force leaders for each section. All attendees of the Fall meeting automatically gained WG membership.

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 & Ismail Guner (absent)
- Task Force 3 – Types of Reconditioning & Reclamation Processes
  - Ed teNyenhuis & Dave Sundin (absent)
- Task Force 4 – Oil (liquid) Tests & Their Significance
  - Andy Holden & Ismail Guner (absent)
- Task Force 5 -- Editor at Large
  - Jinesh Malde & Ed teNyenhuis

## Task Force 1 Update

- Plan is to add the topic of PCBs and other fluids to the existing section
- There are currently 3 additional volunteers, and any additional volunteers should email the TF leader at [jeremiah.l.bradshaw@ieee.org](mailto:jeremiah.l.bradshaw@ieee.org)

## Task Force 2 Update

- Work will begin on this section after the Spring 2022 meetings
- The TF leader asked to receive the current C57.637 document and that will be provided by the Secretary
- There are currently no volunteers for this group outside of the two TF leaders so anyone who wants to contribute should email the TF leader at [jineshmalde@mimaterials.com](mailto:jineshmalde@mimaterials.com)

## Task Force 3 Update

- Work has begun and is projected to be 90% complete at this time
- There was no request for volunteers
- The TF leader reviewed the current edits with the attendees. Most of these were adding clarification text to the existing document.
- A wider review including others may determine that some sections are no longer valid to the industry.
- Several topics and questions were raised including:
  - Lance Lewand (LL) asked if the document is required to use SI units as is the practice with ASTM
  - Scott Reed (SR) suggested that the group consider removing those sections no longer technologically relevant
    - LL suggested that references to the blotter Press be removed

- Jinesh Malde (JM) reminded the group that the word “oil” should be replaced with liquids in a similar was as done in C57.166
- Mike Bonn (MB) offered that a clear definition of rerefined and reclaimed oil would be useful for the reader
  - Note made by TF1
  - LL offered that ASTM addresses rerefined and IEEE addresses reclaimed
  - JM offered that C57.166 has sections dedicated to the definitions of liquids
  - SD suggested that a reference to C57.166 be included inside C57.637
- Stuart Chambers (SC) asked a clarifying question about the size of units (distribution vs. power) being referenced
- LL inquired about how ester manufacturers are measuring the concentration of inhibitor and proprietary additives after filter with Fuller’s Earth
- Alan Sbravati (AS) shared that he and JM are working on a new method at ASTM and that esters do not see as large a loss in additives compared to mineral oil after clay treatment
- LL suggested that the word “moisture” be replaced with water to improve accuracy of the document
- Deanna Woods (DW) shared that her company, Alliant Energy, has an extensive library of data about DGA on ester filled transformers and would be willing to contribute that if it brings value

#### Task Force 4 Update

- Work will begin on this section after the Spring 2022 meetings
- There is currently one volunteer for this group outside of the two TF leaders so anyone who wants to contribute should email the TF leader at [andy.holden@ergon.com](mailto:andy.holden@ergon.com)

#### Task Force 5 Update

- Both TF leaders were present, but no update was provided
- The Chair reminded all TF leaders to use the IEEE template provided to them and not deviate from that format

#### Task Force actions planned before the Fall 2022 (Charlotte) meeting:

- Each TF will begin their efforts and report back with an update
- Any questions, comments, concerns, or needs should be brought to the attention of the Chair and Secretary in the interim

With no other business to address the meeting was adjourned by the Chair at 10:02am.

## *Appendix V*

### **Working Group C57.155 – Guide for Interpretation of Gases Generated in Natural Ester and Synthetic Ester-Immersed Transformers**

**Tuesday, March 29, 2021  
3:15 PM – 4:30 PM (Mountain time)  
Virtual Meeting**

#### **Minutes of Working Group Meeting**

Chairman: Alan Sbravati  
Vice Chair: Lance Lewand  
Secretary: Interim secretary Jinesh Malde

The meeting was called to order at 3:15 pm by the Chair.

Attendance roster was circulated. There were 55 participants in the meeting, 12 out of 24 members were present as per sign in attendance sheet however when roll call was done only 10 members were present. Quorum was not met during roll call. Table below shows the participants in the meeting.

Attendance list:

	Last Name	First Name	Role				
				28.	Lucas, P.E.	Tiffany	Guest
1.	Almeida	Nabi	Guest	29.	Malde	Jinesh	Member
2.	Arnold	Elise	Member	30.	Mbouombouo	Mama	Guest
3.	Arteaga	Javier	Guest	31.	McBride	Brian	Guest
4.	Biggie	Kevin	Guest	32.	Nune	Arturo	Guest
5.	Boman	Paul	Member	33.	Panesar	Parminder	Member
6.	Bonn	Mike	Guest	34.	Patel	Vinay	Guest
7.	Bradshaw	Jeremiah	Member	35.	Pollaro	Dominic	Guest
8.	Calitz	David	Guest	36.	Pruente	John	Guest
9.	Castellanos	Juan	Guest	37.	Sato	Erick	Guest
10.	Chambers	Stuart	Member	38.	Sbravati	Alan	Chair
11.	Christodoulou	Larry	Guest	39.	Shingari	Avijit	Guest
12.	Davoudi	Pounch	Guest	40.	Soto	Mauricio	Member
13.	De Oliveira	Herton	Guest	41.	Sparling	Brian	Guest
14.	Draper	Zack	Guest	42.	Stankes	Marcus	Guest
15.	Faur	Florin	Guest	43.	Tillery	Timothy	Guest
16.	Frimpong	George	Member	44.	Tournoux	Dan	Guest
17.	Frotscher	Rainer	Guest	45.	Vyas	Pragnesh	Guest
18.	Giraldo	Orlando	Guest	46.	Walters	Shelby	Guest
19.	Harper	Robert	Member	47.	Wang	Evanne	Guest
20.	Holden	Andrew	Guest	48.	Weiss	Zachery	Guest
21.	Jakob	Karl	Guest	49.	White	Leon	Guest
22.	Kaineder	Kurt	Guest	50.	Whitehead	William	Member
23.	Konta	Ivan	Guest	51.	Whitten	Christopher	Guest
24.	Kutzleb	Michelle	Guest	52.	Woods	Deanna	Guest
25.	Larison	Andrew	Guest	53.	Yazdani	Mana	Guest
26.	Lewand	Lance	Vice-Chair	54.	Zarnowski	Michael	Guest
27.	Li	Chao	Guest	55.	Zemanovic	Kyle	Guest

Chair presented the agenda in the meeting. Since quorum was not met during roll call the agenda was not approved. The Chair presented the patent claim slides. No patent claims mentioned in the meeting. Copyright policy was showed and no comments were received.

Previously circulated agenda

1. Introductions
2. Approval of Agenda
3. Review of Fall 2021 Working Group Minutes

4. Call for Patents ... Please read slides before meeting
5. Review of Copyright Policy.... Please read slides before meeting
6. Review of TF1 on Developing a program code/system to analyze data and later build up a database
  - 6.1 Presentation - Lance Lewand: "Gassing behavior of natural and synthetic esters in laboratory trials of simulated heat runs"
  - 6.2 Presentation – Zack Draper: "Overview of Normalized Energy Index Method"
7. Review of TF2 on Reviewing the content of the current C57.155
8. New Business
9. Adjourn

## Discussions:

### Task Force(TF) 1 Report:

The Chair mentioned that a virtual meeting took place in March to share the progress made. The Chair had to take over TF Chairmanship as Jon Karas had stepped down due to employment changes and not being in the industry anymore. In the meeting in March, the data fields were discussed.

The Chair highlighted the potential difficulties in data collection and analysis:

- a) The service history of ester liquids is not as mature as mineral oil transformers hence not enough data is available for transformers in service for a long time.
- b) Skewed data sample may be found based on the different types of applications

The fields of data to be collected was presented to the WG participants. Several comments were made:

- A field should be added to determine if the sample was a routine sample or investigation. Lance Lewand mentioned that the information would not be easy to find in labs.
- A field should be added on transformer design limits i.e. operating temperate of transformer.
- There should be information on when sample was tested and when the lab testing took place. Comment was made that although the information would be helpful, it is not often collected by the technicians sampling the liquid from the transformers.
- There might be a need to see if there are outliers based on the percentage confidence. Chair mentioned that the data will have to be analyzed for outliers.
- It would be interesting to know if samples received may be from failure or if a transformer saw an event. Chair mentioned that for Table 1, it would involve information on DGA on transformers that are normal in-service.

Two presentations were made to the working group:

- First presentation was by Zach Draper on "Overview of Normalized Energy Index Method" The presentation was focused on Normalized Energy Intensity (NEI) and how it would be useful for ester standard. The advantages of NEI were presented along with example on how to calculate the energy it would take to break the molecule to produce the gases. Zach also explained what would be needed to calculate the heats of formations of different types of ester liquids.
- Second presentation was by Lance Lewand on "Gassing behavior of natural and synthetic esters in laboratory trials of simulated heat runs". The testing was performed on mineral oil, natural ester, and synthetic ester liquids on gas generation. The data presented was to compare the gas generation in the liquids with and without transformer construction material. The gas patterns were analyzed under different test temperatures.

Josue Rodriguez was going to present on the comparison between existing C57.155 and C57.104 however that was moved to the next meeting.

The working group is still in early stages to discuss about the data to collect and how to collect but will eventually be looking for volunteers to work on the different sections.



**Old Business:**

No old business was discussed in the meeting.

**New Business:**

No new business was brought forward by the participants in the meeting.

**Adjournment:**

Meeting was adjourned at 4:28pm.

Jinesh Malde, Secretary

Alan Sbravati, Chair

## *Appendix VI*

### **Task Force C57.139 – Guide for Interpretation of Gases Generated in Liquid Type Load Tap Changers**

**Tuesday, March 29, 2022  
4:45 PM to 5:50 PM (mountain time)  
Hyatt Regency Denver Colorado**

#### **Minutes of Task Force Meeting**

Chair            Rainer Frotscher

Vice Chair     John Prunte

Secretary     Paul Boman

Meeting took place on March 29, 2022, from 4:45 PM to 5:50 PM

Total attendance record: 33, members: 7, Guests: 26, with 11 attendees requesting membership.

<b>First Name</b>	<b>Last Name</b>	<b>Meeting Request for Membership / Member</b>
Paul Su	Boman	Secretary
Larry	Christodoulou	S22
Rainer	Frotscher	Chair
Michelle	Kutzleb	S22
Olivier	Lejay	x
John	Prunte	Vice-Chair
Scott	Reed	x
Jonathan	Sinclair	S22
Paul	Su	Guest
Ed	teNyenhuis	x
Christopher	Whitten	x
Axel	Kraemer	Guest
Bernhard	Kurth	Guest
Sebastian	Rehkopf	Guest
Chao	Li	Guest
Mario	Alonso	S22
Parminder	Panesar	S22
Arturo	Nunez	S22
Tim	Rinks	Guest
Perry	Reeder	S22
Matthew	Webb	S22
Tiffany	Lucas	Guest

Daniel	Tournouy	Guest
Allen	Clarke	Guest
Florin	Faur	S22
Hugo	Flores	S22
Jennie	Aldenlid	Guest
Niklas	Gustanusson	S22
Zachary	Hutchinson	Guest
Nathan	Jacob	Guest
Tom	Matson	Guest
David	Bureke	Guest
Hampton	Steele	Guest

### Agenda

#### Topics:

- Welcome
- Agenda Approval
- Introduction of Chair, Vice Chair and Secretary
- Membership in C57.139: current members / call for WG members / Paper rosters
- IEEE SA Copyright Policy / Call for Patent Claims
- Approval of Meeting Minutes
- Actual State of PAR
- Approved Title, Scope and Purpose (after changes initiated by NesCom)
- Possible Improvements on Guide – Discussion and Definition of Work Items
- DGA Limit Values for major LTC classes - Paths to set up an LTC DGA database
- Adjourn Meeting

### Minutes

- Established Quorum, 7 members were present out of 13 members in total
- Agenda was unanimously approved by WG
- Call for essential patent Claims: Ed teNyenhuis stated there was one LOA from 2013 by Reinhausen Germany
- Copyright Policy was discussed.
- Fall 2021 TF Meeting Minutes: 1<sup>st</sup> Motion by Christopher Whitten to accept the Minutes without correction, 2<sup>nd</sup> by Ed teNyenhuis, with unanimous approval by WG.
- Introduction of WG Officers
- PAR was reviewed, as approved by NesCom, with expiration in December 2026. All work incl. Ballot should be done by end of 2025.
- Chair then started Discussion on:
  - a) Vision for Guide
    - Statistical analysis will be moved into main body of Guide (normative)
    - Duval Triangle will be shifted into normative section
    - New annex for classification of all LTC models known worldwide, using the 4 letter IEEE nomenclature.
  - b) Limitation and validation for LTC DGA
    - Duval Triangle not applicable to certain tap-changer models (e.g. high speed resistor type LTCs)
    - Approach to identify the typical gas patterns (arcing, sparking and heating) found in LTCs; superposition of patterns => conclusions.
  - c) The topical format should align as much as possible with C57.104.
  - d) Adopt graphical representation of gas quotients from IEC.

- e) Evaluate applicability of carbon oxide gases (no or less cellulose in LTCs).
- f) Discuss LTC DGA for alternative liquids; lack of sample data may prevent its inclusion in the Guide.
- g) Give advice for online DGA monitoring in LTCs (see CIGRÉ TB 783)
- h) A short discussion was conducted on the relevance and benefit of a DGA database for various LTC models. Data must be handled confidentially and supplemented by operational data to be helpful. Possible data sources are TjH2b, Hitachi Power and DeltaX.

Meeting adjourned at 5:50 PM.

## *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 29, 2022  
11:00 AM – 12:15 PM (mountain time)  
Hyatt Regency Denver Colorado

#### **Minutes of Task Force Meeting**

**Chair** : Bruce Forsyth  
**Vice-Chair** : Jinesh Malde  
**Secretary** : Javier Arteaga (appointed after the meeting)

#### **1. Call to Order**

The meeting was called to order at 11:00 AM on March 29, 2022. The Chair announced that the meeting would be adjourned a few minutes before the regularly scheduled adjournment of 12:15 PM MDT because of a conflict with the next Committee activity.

#### **2. Chair's Remarks**

##### **2.1 Introduction and Attendance Sheets**

Attendance rosters were circulated. There were 72 participants present and 50 participants requested voting membership. Since this was the first meeting of the Working Group, voting membership was automatically granted to those who checked the Membership Request box in the attendance roster. Per the Working Group Policies and Procedures, voting membership status will be effective as of the start of the next meeting. Table 1 lists the participants present and requesting voting membership at this meeting. Table 2 lists the guests present at this meeting.

**Table 1: Voting Membership\* Attendance**

<b>Member Name</b>	<b>Affiliation</b>	<b>Role</b>	<b>Present?</b>
Adams, Kayland	Prolec-GE Waukesha	Member*	X
Aikens, Tom	Virginia Transformer	Member*	X
Almeida, Nabi	Prolec-GE USA	Member*	X
Alonso, Mario	Georgia Transformer	Member*	X
Ansari, Tauhid	Hitachi Energy	Member*	X
Antosz, Stephen	Consultant	Member*	X
Arnold, Elise	SGB-Germany	Member*	X
Arteaga, Javier	Hitachi Energy	Member*	X

<b>Member Name</b>	<b>Affiliation</b>	<b>Role</b>	<b>Present?</b>
Beaudoin, Jason	Weidmann Electrical Technology	Member*	X
Boettger, William	Boettger Transformer Consulting LLC	Member*	X
Bohrn, Josh	Siemens Energy	Member*	X
Botti, Michael	Hyosung HICO	Member*	X
Bradshaw, Jeremiah	Bureau of Reclamation	Member*	X
Calitz, David	Siemens Energy	Member*	X
Castellanos, Juan	Prolec GE	Member*	X
Chakraborty, Arup	Delta Star Inc.	Member*	X
Clarke, Allen	Delta Star Inc.	Member*	X
Davis, Eric	Burns & McDonnell	Member*	X
Debass, Samson	EPRI	Member*	X
Draper, Zachary	Delta-X Research	Member*	X
Faur, Florin	Prolec GE Waukesha	Member*	X
Forsyth, Bruce	Bruce Forsyth and Associates PLLC	Chair	X
Garcia, Eduardo	Siemens Energy	Member*	X
Griesacker, Bill	Duquesne Light	Member*	X
Hollrah, Derek	Burns & McDonnell	Member*	X
Jensen, Nick	Delta Star Inc.	Member*	X
Joshi, Akash	Black & Veatch	Member*	X
Kazmierczak, Jerzy	Hitachi Energy	Member*	X
Kirchenmayer, Egon	Siemens Energy	Member*	X
Lewand, Lance	Doble Engineering	Member*	X
Malde, Jinesh	M&I Materials Inc.	Vice-Chair	
Murray, David	TVA	Member*	X
Musgrove, Ryan	Oklahoma Gas & Electric	Member*	X
Patel, Nitesh	Hyundai Power Transformer	Member*	X
Patel, Sanjay	Royal Smit Transformers	Member*	X
Reed, Scott	MVA	Member*	X
Sahin, Hakan	Virginia Transformer Corp	Member*	X
Sarkar, Amitabh	Virginia Transformer Corp	Member*	X
Schrammel, Alfons	Siemens Energy	Member*	X
Sinclair, Jonathan	PPL Electric	Member*	X
Skinger, Kenneth	Scituate Consulting, Inc.	Member*	X
Som, Sanjib	PTTI	Member*	X
Staley, Brad	Salt River Project	Member*	X
Thompson, Ryan	Burns & McDonnell	Member*	X
Tolcachir, Eduardo	Tubos Trans Electric	Member*	X
Varghese, Ajith	Prolec GE Waukesha	Member*	X
Varnell, Jason	Doble Engineering	Member*	X
Wallach, David	Duke Energy	Member*	X
Zemanovic, Kyle	Eaton	Member*	X
Zibert, Kris	Allgeier Martin	Member*	X
Ziparizoski, Zan	Howard Industries	Member*	X

\* Voting Membership will take effect at the beginning of the next meeting.

**Table 2: Guests Present**

<b>Guest Name</b>	<b>Affiliation</b>
Benach, Jeffrey	Megger
Byrnes, Ryan	HICO America
Carrizales, Juan Alfredo	Prolec GE
Christodoulou, Larry	Electric Power Systems
Downey, Andy	Prolec GE Waukesha
Faherty, Joe	OTC Services
Hakim, Shamaun	WEG Transformer USA
Havens-Spillers, Bridget	Ameren Missouri
Jakob, Karl	Cargill
Jordan, Steve	TVA
Nesvold, Brady	Xcel Energy
Nims, Joe	Allen & Hoshall
Pinard, Matt	Weidmann Electrical Technology
Powell, Chad	Hitachi Energy
Radbrandt, Ulf	Hitachi Energy
Rainer, Frostcher	Reinhausen Germany
Rehkopf, Sebastian	Maschinenfabrik Reinhausen
Sen, Cihangir	Duke Energy
Soto, Mauricio	Hitachi Energy
Steele, Hampton	TVA
Steineman, Andy	Delta Star
Wright, Jeffrey	Duquesne Light

## **2.2 Participant Behavior**

The Chair showed and briefly reviewed the IEEE SA slides related to participant behavior in the individual Working Group process. There were no comments.

## **2.3 Essential Patent Claims**

The Chair showed and briefly reviewed the IEEE SA slides related to Essential Patent Claims. The Chair provided an opportunity for participants to identify patent claim(s) or patent application claim(s) and/or the holder of patent claim(s) or patent application claim(s) of which the participant is personally aware and that may be essential for the use of this standard. No claims were made.

## **2.4 Copyright Policy**

The Chair showed and briefly reviewed the IEEE slides related to Copyright Policy. There were no comments.

### 3. Review of Agenda

The proposed agenda (see Figure 1) was shown. The Chair asked if there were any requested changes to the agenda. None were requested and as such the agenda was considered approved.

<p align="center"><b>PRELIMINARY MEETING AGENDA</b>          IEEE PES Transformers Committee          Insulating Fluids Subcommittee  <b>Working Group PC57.130</b>          Location: Denver, Colorado          Tuesday, March 29, 2022   11:00 AM – 12:15 PM MDT</p>	
<b>Chair:</b> Bruce Forsyth	<b>Vice Chair &amp; Secretary:</b> Jinesh Malde
<ol style="list-style-type: none"> <li>1. Call to Order</li> <li>2. Chair's Remarks               <ol style="list-style-type: none"> <li>a. Introduction and Attendance Sheets</li> <li>b. Participant Behavior</li> <li>c. Essential Patent Claims</li> <li>d. Copyright Policy</li> </ol> </li> <li>3. Review of Agenda</li> <li>4. Review of PAR changes required by NesCom</li> <li>5. Discussion of PC57.130 project milestones</li> <li>6. Discussion of content...desired changes</li> <li>7. New Business</li> <li>8. Adjournment</li> </ol>	

Fig

**Figure 1: Proposed Agenda**

### 4. Review of PAR Changes Required by NesCom

The Chair reviewed the PAR that was originally submitted to NesCom as well as the final PAR that was approved by NesCom. Only a few changes were requested by NesCom.

The approved Scope is as follows:

*“This document defines evaluation procedures and guidelines for acceptable levels of gases generated in conventional mineral oil-filled transformers and reactors during factory temperature rise tests.”*

The approved Purpose is as follows:



*“The purpose of this Guide is to provide guidance in the application of dissolved gas analysis (DGA) to transformers and reactors subjected to factory temperature rise tests. This document consists of evaluation procedures and guidelines for acceptable levels of gases generated in conventional mineral-oil filled transformers and reactors during factory temperature rise tests.”*

## 5. Discussion of PC57.130 Project Milestones

The Chair reviewed the basic milestones for the project as follows:

- Identify revision needs; form TF groups.....March 2022 – Oct 2022
- Document development.....Mid 2022 – Fall 2024
- Submit to SC for sponsor ballot approval.....Fall 2024
- Begin Sponsor ballot process (several steps).....Late 2024
- Ballot resolution & re-ballot.....Early 2025 – Mid 2025
- Submission of approved document.....Fall 2025

It was noted that the PAR expires at the end of 2026, but since the current document expires at the end of 2025 it is necessary to accelerate the work and finish before the end of 2025.

## 6. Content Discussion

The Chair opened the floor to discussions related to improvements that should be considered by the Working Group to improve the Guide. The basic structure of the existing document was reviewed, with focus on Table 2 that provides gas generation rate limits for hydrogen (H<sub>2</sub>), carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), and the combined total of methane (CH<sub>4</sub>), ethane (C<sub>2</sub>H<sub>6</sub>), and ethylene (C<sub>2</sub>H<sub>4</sub>). The combine total of the latter three is referred to as the hydrocarbon component. The following bullets summarize the suggestions made.

- **Ester liquids.** Should the scope be expanded to include ester liquids? There was general agreement in favor of expanding the scope to include ester liquids. The Chair noted this would require a PAR revision. There was some question as to whether sufficient data exists to develop limits for ester liquids (both natural and synthetic). After some discussion it was agree that a Task Force will be formed to investigate the feasibility of expanding the scope of the document to include ester liquids. Lance Lewand agreed to chair the TF and to report back to the WG no later than the Fall 2022 meeting. Several people volunteered to participate in the TF, including Jeremiah Bradshaw, Javier Arteaga, Sanjay Patel, and Elise Arnold. Any other interested participants are asked to contact Lance Lewand directly.
- **Gassing during overload tests.** A participant asked whether any generation limits are included for overload tests, and if not, should the document be expanded to include such limits.
- **Gassing during other tests.** A participant asked if the document should be expanded to provide gas generation limits for other tests, such as dielectric tests. A comment was made that the current document focuses only on gasses generated during temperature rise tests performed in accordance with IEEE Std C57.12.90™.

- **Are the existing limits still valid?** A participant asked whether industry experience since the current document was published still supports the generation limits contained in Table 2.
- **Is the fundamental approach still valid?** A participant asked whether the basic approach of analyzing generation rates as described in the current document is still considered the best approach. There was general agreement that the approach is acceptable, and if the document is expanded to include ester liquids new tables similar to Table 2 should be introduced as necessary.
- **Does the document apply to full current and full voltage tests on load tap changers (LTC)?** A question was asked related to LTCs, but it was generally agreed the gas generation limits described in the current document are for temperature rise tests on the main transformer only and do not apply to special load current or voltage tests that focus on LTC operation.
- **Guidelines for reporting methods and duration of temperature rise test.** A participant recommended guidelines be introduced to document the specific procedure(s) followed during the temperature rise tests. Specifically, the participant recommended documenting whether any overloads or cooling restrictions were employed to shorten the duration of the temperature rise test.
- **Consideration for higher temperature transformers.** A discussion took place regarding the applicability of the Guide to transformers with non-standard temperature rise ratings (e.g., 75 °C rise). A participant mentioned it is the absolute temperature that we should discuss and not temperature rises since ambient temperature is frequently a consideration in the application of higher temperature rise designs. More specifically, he stated it is the absolute temperature within the transformer that is of concern, not necessarily the temperature rise rating.
- **Separation of gasses from hydrocarbon component.** A few comments were made suggesting there may be data supporting the separation of one or more gas from the hydrocarbon group (methane, ethane, ethylene). Specifically, it was suggested that methane should be separated for mineral oil and ethane may need to be separated for natural esters due to their relative concentrations with respect to the other gasses.
- **Data supporting the original values in Table 2.** There were a few comments about the data that was used to generate the existing limits in Table 2. Specifically, what was the source of the data and is it still available? The Chair stated he will reach out to the officers of the original documents to inquire about the original data.
- **Should columns be added to Table 2 with limits for various cooling modes (e.g., ONAN, ONAF, etc.).** A participant felt adding columns to Table 2 with separate limits for different cooling modes would be beneficial. Another participant stated it is not possible to determine during which cooling mode gasses are produced using the current temperature rise test methods. Specifically, current methods may run a temperature rise test at rated MVA, then immediately move to the maximum MVA. Unless separate tests are performed, perhaps with degassed oil for each, it is not possible to know when the gasses were generated.
- **Adding recommended actions.** The current Guide lists gas generation rate limits with three condition levels (Condition I - No problem detected; Condition II - Possible problem; Condition III - Likely problem). A participant stated it would be beneficial to expand the Guide to provide recommendations regarding investigative steps to take for conditions II and III.

## **7. Unfinished Business**

No unfinished business topics were raised for discussion.

## **8. New Business**

No new business topics were raised for discussion.

## **9. Adjournment**

Because of a scheduling conflict for the next Committee activity, the Chair adjourned the meeting at 12:10 PM MDT.

Prepared and submitted by,

Bruce Forsyth  
Chair

April 4, 2022

# ANNEX H Insulation Life Subcommittee

**March 30<sup>th</sup>, 2022**  
**Denver, CO**

**Chair: Sam Sharpless**  
**Vice-Chair: Jinesh Malde**  
**Secretary: Anastasia O'Malley (not present)**

The Insulation Life Subcommittee (ILSC) was called to order by the Chair on March 30<sup>th</sup>, 2021, at 10:02 am MDT. 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 taskforces should avoid scope creep. If new information arrives late, it should be documented in the minutes for the next revision. If necessary, the standard/guide can be reopened for amendment.

The Chair encouraged working groups to conduct on-line meetings between the regular Transformer Committee Meetings to move projects along. Notice must be sent out to all members, attendance recorded, and minutes taken to be included within the subcommittee minutes. Any PAR extension requests need to be approved by the working group and documented in the minutes. The Chair reminded everyone that working groups must achieve a two-thirds majority to submit a document for Sponsor Ballot. The subcommittee must achieve a simple majority to submit a document for Sponsor Ballot.

The Chair 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 discussed the membership requirements and recognized the following new members: Arup Chakraborty, Phil Hopkins, Stephanie Denzer, Markus Schiessl, Kent Miller.

The Chair stated that Jon Karas, Kevin Rapp and John Reagan were downgraded to guest.

## **H.2 Secretary's Report**

The attendance poll reported that 61 out of 120 members were present in the meeting along with 86 guests. A quorum had been achieved. For the Spring 2022 Denver meeting, only paper roster was 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 mention it on the paper roster. 3 guests requested membership. A list of attendees is provided at the end of this report.

The agenda for the meeting had been provided to participants in advance of the meeting for review. Phil Hopkins moved for approval of the agenda and it was seconded by Kent Miller. After hearing no objection from the

attendees, the meeting agenda was approved by unanimous consent. The Fall 2021 subcommittee meeting minutes had been provided to participants in advance of the meeting for review. Mickel Saad made a motion to approve the minutes. Tom Prevost seconded the motion. The Fall 2021 meeting minutes were approved by unanimous consent after hearing no objection from the attendees.

### **H.3 Ballot Approvals**

The Chair requested the members to vote for two standards to go to ballot:

#### **a) PC57-100**

Motion was made by Roger Wicks to go to ballot. It was seconded by Garcia Eduardo. There were no objections and the motion passed by unanimous consent.

#### **b) PC57-162**

Motion was made by Tom Prevost to go to ballot. It was seconded by Bruce Forsyth. There were no objections and the motion passed by unanimous consent.

### **H.4 Taskforce Reports**

#### **H.4.1 Task Force C57.12.90 Clause 11, Temperature Rise Tests – Dinesh Sankarakurup**

<b>TF - Temperature-rise Tests</b>		
<b>Chair: Dinesh Sankarakurup</b>	<b>Vice-Chair: Ajith M. Varghese</b>	<b>Secretary: Open</b>
Room: Centennial H	Date: March 29th 2022	Time: 1:45 am to 03:00 pm
Total TF Members: 43	Members present at the Quorum: 10	Attendance Per Roster : 14
Guests present: 10	Membership requested: 1	Membership accepted: 0

#### **Chair's Remarks**

The Chair welcomed members and guests to the spring 2022 meeting. The Chair briefly highlighted the requirement that while introducing one need to state their employer/ company and sponsor if the difference from the company.

Chair made the call for the patent and shared the IEEE SA slides on patent policy and copyright.

Chair informed the TF the John Reagan has stepped down from the role of secretary and for this meeting Vice Chair will also be acting as secretary. If anyone interested in taking up the role of secretary can contact the chair.

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

At the time of quorum only 10 of the 43 members were present. Chair mentioned that all those requested membership during first meeting was granted membership but only 19 members were present during the last meeting and this has further reduced to 10. TF has requested a different timeslot for next meeting as current slot have conflict with RLFT, which is also a TF on continuous revision of C57.12.90.

The Unapproved minutes from the Spring 2021, Fall 2021 meetings and the agenda for Spring 2022 meeting was presented but due to lack of quorum was not approved. These will be emailed to members for the approval.

## TF Discussions and Motion passed.

Results of two surveys were presented

- **Survey 1 : Replacing the word “Ultimate” with “Stabilized” in C57.12.90 clause 11.3.2**

Present wording (C57.12.90- 2021): Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ultimate 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.

Proposed Wording: 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 consecutive 3 h period

Response rate - 22/43 - 50%

Approve – 19/22 = 86%

**TF Discussion/ Decision:** Due to absence of Quorum, no motion was made to take this forward to ILSC.

- **Survey 2, Adding a sentence to section 11.3.2 to clarify ultimate/stabilized liquid temperature rise shall not be averaged, returned with 95% approval**

Present wording (C57.12.90- 2021): Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ultimate 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.

Proposed Wording: Liquid temperature rise is the difference between liquid temperature and ambient temperature. The ultimate 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 Ultimate liquid temperature rise determined at the end of the total loss run shall not be averaged over time

\*Note: Results of Survey # 1 and subsequent decision taken by TF will be incorporated into final draft of this change

Response rate - 22/43 - 50%

Approve – 21/22 = 95%, 1 Abstained

**TF Discussion/ Decision:** Discussed one of the comments to change C to K since its temperature rise (over ambient) and not absolute. After discussion it was agreed to leave it as surveyed since C is used at lot of different places in C57.12.00 and C57.12.90. Due to absence of Quorum, no motion was made to move forward to ILSC.

- **Exponents to be used for K and L Type Cooling Medium**

TF had sought information/data from SC members and guest about m and n exponents to be used for K and L type cooling medium, as C57.12.90 sub clause 11.4.1 and 11.4.2 currently only cover O type cooling medium. However, the TF did not receive any data to support values to be used. In the absence of supportive data, there was a suggestion to add a note to this section, for user/manufacture to agree to values based on provide design/other data, but the consensus was to leave section as is for now.

**TF Discussion/Decision:** TF doesn't plan to pursue this further, unless there are adequate data to support any change.

## Old/ Unfinished Business

- **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.

**TF Discussion/Decision:** Chair reported that current IEEE formula if used for reverse correction give different temperatures for Forward and Reverse correction. Ajith Varghese volunteered to review the formula and will present the findings during next meeting.

- **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 and Ajith Varghese volunteered to review these items and come up with proposals for the next meeting.

- **Hot spot rise calculation for OFAF /OFWF cooler transformer**

Bertrand Poulin: 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

**TF Discussion/Decision:** Juan Castellanos to review C57.119 and make a recommendation to TF during next meeting.

- **Ambient measurement location**

Ajith Varghese: 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

**TF Discussion/Decision:** Had some discussion but no decision was made. In general, agree that 1 to 2 meter is quite large. Users prefer 2 meters, Manufacturers like 1 meter. Discussion to continue.

- **Clarification to Hottest spot Rise calculation using Fiber Optics**

Ajith Varghese: It was reported that some manufacturers are incorrectly reporting/Calculating Fiber optic HSR as the Difference in Fiber Optic Temp during gradient run and ambient. This is not correct as during gradient run, current is correct but Top Oil Temp have cooled down from Temp at total loss heat run. So, the drop in oil temp from total loss to gradient should be added to the fiber optic HSR arrived at gradient run. Difference will be 1-2 Degree C.

**TF Discussion/Decision:** Not discussed

- **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 Discussion/Decision:** Not discussed

## **New Business**

Ewald Schweiger brought up a safety concern regarding resistance measurement done during temperature rise test. Though Standard allow first measurement to be taken within 4 minutes, many customers specification is reducing the limit. Since there is risk of losing order, many manufacturers are accepting reduced time and this indirectly is causing pressure on operators performing hot resistance measurement, with potential of safety mishap.

### **Problem statement**

Current IEEE C57.12.90 [clause 11] regulations require achieving the as quickly as possible time between power shut-off at heat run end and installation of resistance measurement devices.

Current IEEE Standard C57.12.90 [clause 11] limits the period from finalization of heat run test to start of hot resistance measurement to 4 minutes.

Further to this requirement, we frequently are faced with requests from customers to achieve transition times between both tests to below 4 minutes (supported by IEEE base “as quickly as possible” “short-time” requirement).

This has the following consequences:

- test field engineers are under pressure to take additional risks in order to further reduce the transition time
- test field professionals might get exposed to high voltage - potentially causing severe harm (electroshock)
- the testing procedures could be reverted applying state-of-the-art technology including direct winding temperature measurement.

### **Request for modification**

Integrate safety aspects into next revision of IEEE standard C57.12.90 clause 11 to help to establish an intrinsically safe testing process, including technical and engineering controls:

- Prohibited zone should be clearly marked with physical barriers
- Clear signals and verbal communication to start interactions on the product
- At no time possible to approach the energized test object
- Use the directly measured hot-spot temperature based on fiber optics as a basis and calculate the winding temperature rise based on the measured hot-spot temperature and on the measured oil temperatures.



Reliable technologies/products were not available years ago for direct hot-spot temperature measurement but are now available for use in the industry.

- Add a note in paragraph 11.2.2 which allows this alternative method for determination of the winding rise in cases where the direct measurement of the hot-spot temperature is possible. Describe the new procedure in detail.

### **TF Discussion/Decision:**

Due to shortage of time, TF could not discuss this topic during S22 meeting.

Chair noted that the Scope of the proposal/Concern go beyond Section 11 of C57.12.90. So, he will discuss with ILSC Chair to bring this up as topic during Adcom and to make decision which is most appropriate forum to discuss and take action on this item.

### **Adjournment**

Meeting adjourned 03.06 PM.

### **Attendees**

<b>First</b>	<b>Last</b>	<b>Membership</b>	<b>Affiliation</b>
Dinesh	Sankarakurup	Chair	Duke Energy
Ajith	Varghese	Vice-Chair	Prolec GE Waukesha
Bruce	Forsyth	Member	Bruce Forsyth and Associates PLLC
Cihangir John	Sen	Member	Duke Energy
David	Wallach	Member	Duke Energy
Dennis	Marlow	Member	DenMar TDS Transformers
Gary	King	Member	Howard Industries
Gilles	Bargone	Member	FISO Technologies Inc.
Hakan	Sahin	Member	Virginia/Georgia Transformer
Jaber	Shalabi	Member	VanTran Industries, Inc.
Juan	Castellanos	Member	Prolec GE
Marc	Taylor	Member	JFE Shoji Power Canada Inc.
Sam	Sharpless	Member	Rimkus Consulting Group
Steve	Antosz	Member	Stephen Antosz & Associates, Inc
Alex	Alahmed	Guest	Evergy-Wolf Creek
Hampton Allen	Steele	Guest	Tennessee Valley Authority
Hakim	DulaC	Guest	Qualitrol
Jean Noel	Berube	Guest	Rugged Monitoring
Mana	Yazdani	Guest	Trench Ltd
Michael	Shannon	Guest	REA Magnet ire
Muhammad Abdullah	Sohail	Guest	Trench Ltd
Scott H	Digby	Guest	Duke Energy
Tauhid	Ansari	Guest	Hitachi Energy
Tom	Aikens	Guest	Virginia Transformers

Minutes respectfully submitted by:

**Ajith M. Varghese**

Vice Chair and Acting Secretary

## H.5 Technical Activity Reports:

### H.5.1 C57.91 IEEE Guide for Loading Mineral-Oil-Immersed Transformers – David Wallach

Working Group PC57.91 Loading Guide  
Spring 2022 Meeting Minutes  
March 29, 2022, 4:45 PM – 6:00 PM (MST)  
Hyatt Regency Denver Convention Center, Denver, CO

1. The IEEE Copyright, Anti-Trust and Patent policies were presented.
2. Quorum was established: Members in Attendance-27; Total Members-54 and Total Attendees 91.
3. The Spring 2022 Meeting Agenda, Fall 2021 Virtual Meeting and the Dec 2021 Virtual Meeting minutes (all documents were sent prior to the meeting) were adopted unanimously unopposed after the quorum was established.
4. The Chair announced that open-source code discussions were held with Zach Draper, Malia Zaman and Joshua Gay of the IEEE Open-Source Platform Team. This will be probably the first PES WG that will be using this platform resource. It has not been determined if the code will be part of Annex G in the guide document or be made available from the IEEE website. If it is included in the guide, then the scope of the guide's PAR may need to be revised.
5. Bruce Forsyth presented the findings of the hot spot terminology task force meeting held on January 27, 2022. For details, please refer to the task force minutes attached.
6. Bruce Forsyth then proposed a motion as follows:
7. The WG PC57.91 perform a review of the current draft to ensure terms related to *hot spot* and *hottest spot* are used consistently and correctly, and
  - a) The following definition for *hottest spot* be included in Clause 3 of PC57.91:

**hottest spot:** The location of the hottest-spot temperature of a component of a transformer that is in contact with insulation or insulating liquid. The term is frequently used in reference to the hottest location of a particular component, such as a winding or the core.

Note – the term *hot spot* is sometimes used colloquially as a synonym for *hottest spot*, but the preferred technical term is *hottest spot* when referring to the location with the highest temperature.

The motion was seconded by Eduardo Garcia. During the discussions, Sanjib Som questioned that tank and core flux interactions could result in more than one hottest spot. Bruce explained that no specific location has been proposed by the TF and there could be one for the winding and one for the core.

The motion was then unanimously passed with no opposition. The preferred term is now "hottest spot" (not hot spot), and it will replace 52 instances of the term "hot spot" in the current draft guide document.

8. The Chair made a presentation about the changes made to Annex A - Bubble Evolution. He remarked that the proposed revisions were sent out to the WG after the Dec 4, 2021 meeting for comments. Some comments had been received and further revisions were made, and the revised draft was circulated to the WG prior to this meeting. The Chair asked if there were further comments.

Wally Binder wanted to know the basis of the changes for equation A2. The Chair agreed to talk to Oleg Roizman about it and share details with the WG.
9. There was question about the open-source code. Zach agreed to share the code with anyone interested in trying it out. It is written in Python language which is an open-source software that can downloaded from the web. Zach mentioned that he has test run the code and would appreciate if more users could try it as well.
10. The Chair then presented the revisions made to the Thermal Model Clause 7. He remarked that the proposed revisions were sent out to the WG after the Dec 2021 meeting (and prior to this meeting) for comments. The Chair remarked that we may need to check if any copyright approval is required to use some of the new proprietary equations now in Clause 7. The Chair asked if there were any further comments, and they were none.
11. The Chair mentioned that the plan now was to incorporate the revised Clause 7 and Annex A portions in the current draft guide document and send the revised D4 draft as a straw ballot to the WG this summer

for further comments. The final D4 draft of the guide will be put to a WG vote for approval during the Fall 2022 meeting before starting the IEEE SA Ballot process. The goal is to put the guide document on the Fall 2023 Revcom Agenda as the current PAR expires in 2023.

12. The Fall 2022 will be held between Oct 16-20, 2022, at Charlotte.

13. The Chair asked if there were any open items for discussions, and hearing none, the meeting was concluded.

**Chair:** David Wallach

**Vice-Chair:** Javier Arteaga

**Secretary:** Kumar Mani

#### Attendance

First Name	Last Name	Role	Company	Requested Membership
Kayland	Adams	Guest	SPX Transformer Solutions, Inc.	
Alex	Alahmed	Guest	Energy- Wolf Creek	
Elise	Arnold	Guest	SGB	
Javier	Arteaga	Vice-Chair	Hitachi Energy	
Onome	Avanoma	Guest	MT Consulting	
Gilles	Bargone	Member	FISO Technologies Inc.	
Jared	Bates	Guest	Oncor Electric Delivery	Y
Jason	Beauddin	Guest	Weidmann Electrical Technology	
Olle	Benzler	Guest	Megger	
Jean-Noel	Berube	Guest	Rugged Monitoring Inc.	
Wallace	Binder	Member	W Binder Consultant	
Daniel	Blaydon	Member	Baltimore Gas & Electric	
William	Boettger	Guest	Boettger Transformer Consulting LLC	
Jeremiah	Bradshaw	Guest	Bureau of Reclamation	
Juan Alfredo	Carrizales	Guest	Prolec GE	
Juan	Castellanos	Member	Prolec GE	
Arup	Chakraborty	Guest	Delta Star Inc.	Y
Stuart	Chambers	Guest	Powertech Labs Inc.	Y
Olivia	Cordova	Guest	Bureau of Reclamation	
Eric	Davis	Guest	Burns & McDonnell	
Pounesh	Davoudi	Guest	Delta Star Inc.	
Caesar	Diaz	Guest	EATON Corporation	
Scott	Digby	Guest	Duke Energy	

First Name	Last Name	Role	Company	Requested Membership
Paul	Dolloff	Member	East Kentucky Power	
Zachary	Draper	Member	Delta-X Research Inc.	
William	Elliott	Guest	Prolec GE	
Ergenni	Ermakov	Guest	Hitachi Energy	
Marco	Espindola	Guest	Hitachi Energy	
Sanford	Fong	Guest	Georgia Power Co.	
Bruce	Forsyth	Member	Bruce Forsyth and Associates PLLC	
George	Frimpong	Member	Hitachi Energy	
Eduardo	Garcia Wild	Member	Siemens Energy	
Shamann	Hakim	Guest	WEG Transformers USA	
Saramma	Hoffman	Member	PPL Electric Utilities	
Ryan	Hogg	Guest	Bureau of Reclamation	
Nick	Jensen	Guest	Delta Star Inc.	
Stephen	Jordan	Guest	Tennessee Valley Authority	
Akash	Joshi	Guest	Black and Veatch	
Jerzy	Kazmierom	Guest	Hitachi Energy	Y
Zan	Kiparizoski	Guest	Howard Industries	
Egon	Kirchenmayer	Member	Siemens Energy	
Anton	Koshel	Guest	Delta Star Inc.	
Krzysztof	Kulasek	Guest	Hitachi Energy	
Aleksandr	Levin	Member	Weidmann Electrical Technology	
Weijun	Li	Member	Braintree Electric Light Dept.	
Kumar	Mani	Secretary	Duke Energy	
Balakrishnan	Mani	Guest	Virginia Transformer Corp.	
Bruno	Mansuy	Guest	Trench France SAS	
Rogelio	Martinez	Member	Georgia Transformer	
Lee	Matthews	Member	Howard Industries	
Tony	McGrail	Guest	Doble Engineering Co.	
Emilio	Morales-Cruz	Member	Qualitrol Company LLC	
Joe	Nims	Guest	Allen & Hoshall, Inc.	
Dwight	Parkinson	Guest	EATON Corporation	
Nilesh	Patel	Guest	Hyundai Corporation	
Sanjay	Patel	Guest	Royal SMIT Transformers	
Homero	Portillo	Member	Advanced Power Technologies	
Chad	Powell	Guest	Hitachi Energy	
Thomas	Prevost	Guest	Weidmann Electrical Technology	
Benjamin	Riggins	Guest	Xcel Energy	
Tim	Rocque	Guest	SPX Transformer Solutions, Inc.	
Mickel	Saad	Member	Hitachi Energy	
Hakan	Sahin	Guest	Virginia/Georgia Transformer	
Albert	Sanchez	Guest	Knoxville Utilities Board	
Dinesh	Sankarakurup	Guest	Duke Energy	
Amitabh	Sarkar	Member	Virginia Transformer Corp.	
Daniel	Sauer	Guest	EATON Corporation	
Steven	Schappell	Member	SPX Transformer Solutions, Inc.	
Markus	Schiessl	Guest	SGB	
Jeff	Schneider	Guest	Power Partners	
Alfons	Schrammel	Guest	Siemens Energy	
Jaber	Shalabi	Guest	Vantran Transformer	

First Name	Last Name	Role	Company	Requested Membership
Samuel	Sharpless	Member	Rimkus Consulting Group	
Adetokunbe	Shosanya	Guest	Xcel Energy	
Sanjib	Som	Guest	Pennsylvania Transformer	Y
Brad	Staley	Member	Salt River Project	
Kyle	Stechschulte	Guest	American Electric Power	
Troy	Tanaka	Guest	Burns & McDonnell	
Mike	Thibault	Guest	Pacific Gas & Electric	Y
Ryan	Thompson	Guest	Burns & McDonnell	
Mark	Tostrud	Member	Dynamic Ratings, Inc.	
Alan	Traut	Guest	Howard Industries	Y
Olivier	Uhlmann	Guest	Reinhausen Canada	
Alwyn	Van Der Walt	Guest	Electrical Consultants, Inc.	Y
Robert	Van Tol	Guest	Commonwealth Associates, Inc.	
Ajith	Varghese	Guest	Prolec GE	
Jason	Varnell	Member	Doble Engineering Co.	
David	Wallach	Chair	Duke Energy	
Shelby	Walters	Guest	Howard Industries	
Alan	Washburn	Guest	Burns & McDonnell	
Bruce	Webb	Member	Knoxville Utilities Board	
Jeffrey	Wright	Member	Duquesne Light Co.	

### **H.5.2 C57.100 IEEE Standard Test Procedure for Thermal Evaluation of Liquid-Immersed Distribution and Power Transformers – Roger Wicks**

Spring 2022 Meeting – 29 March 2022, 11:00 a.m. – 12:15 p.m. MDT, Denver, CO, USA

Chair: Roger Wicks,  
Secretary: Kevin Biggie

The Chair called the meeting to order at 11:00 a.m. and welcomed attendees. Attendance was taken at the beginning of the meeting, and 22 members were present of 55 in the WG (one Member requested Guest status since the Fall 2021 meeting, reducing membership from 56 to 55 members), thus a quorum (of 28 of 55 members) was not achieved, and the agenda and last meeting minutes could not be approved.

Subsequent to the meeting, attendance was confirmed to be 66 attendees, with 26 members present and 40 guests (roster listed at the end of the minutes). Five guests requested membership, but a check of the current P&P manual for WGs confirmed that “New voting membership requests will not be accepted after the document has been approved by the Working Group for sponsor ballot.” Thus, since the WG recently approved the document for sponsor ballot, new members will no longer be accepted.

The Chair reviewed the meeting agenda. Essential Patent Claims information and copyright information were reviewed, and no comments were noted.

The Chair then proceeded with a review of a prepared meeting presentation, beginning with a Chair's introduction on the status, recent activities and next steps with the document. The Chair then reviewed the results of the WG ballot to go to sponsor ballot, and as Draft 2.1 circulated as-is received 72% in favor of going to sponsor ballot, it exceeded the required two-thirds vote.

Also, the WG voted and approved by 94% in favor to form a Comment Resolution Group (CRG) of at least 5 members (but an odd number). The Chair then solicited volunteers and confirmed a CRG of the following 7 Members: George Frimpong, Stuart Chambers, Alan Sbravati, Jinesh Malde, Saramma Hoffman, Kevin Biggie and Roger Wicks.

Then a presentation was made by Tom Prevost supporting the proposed updated definition of thermally upgraded paper and the corresponding recent addition of Annex H to the draft. It was mentioned that the timing is good as the definition for TUP was currently open for revision in IEC TC14, IEC TC15, IEEE C57.100 and IEEE C57.12.80, and thus it is a good time to align the definition between the groups.

The Chair then reviewed some comments to the definition provided by IEC TC15 and mentioned that the comments can be considered by the CRG. Tom Prevost provided early specific feedback that putting both of the two common nitrogen content measurement methods in the standard was a good idea (ASTM D982 is the only one mentioned in the current draft). Also, 1.3% minimum nitrogen was chosen because a published reference (which he authored) showed that 1.3 % correlated quite well to the ageing test criteria of 50% tensile retention, providing also necessary margin in the case of any uncertainty.

The Chair then reviewed comments made by George Frimpong regarding the list of preferred thermal classes in Table 2, and a proposal to add more that have smaller intervals (propose including 150, 160 and 170 thermal classes to Table 2). George clarified that he is OK to keep the preferred list in C57.154, but suggests expanding it in C57.100. He also proposed to change the word "preferred" to "example" thermal classes in Table 2. Alan commented that the preferred list came from NEMA, and because there is some variation in the aging test, that rounding down to the nearest preferred option is a way to account for the variability. Roger added that it would be a challenge how to deal with the preferred thermal classes being listed in several tables in C57.154, and linked to IEEE 1. Jinesh Malde spoke in favor of keeping the word preferred because it helps to link to the thermal classes listed in C57.154. At the conclusion of the discussion, there was no opposition to resolving the comments through further discussion by the CRG, and there was no support for the need for a non-binding vote by the entire WG.

The Chair then reviewed comments received from NEMA on the proposed informative Annex D outlining a modified test procedure to determine thermal class of wire enamels as part of the full system of insulation materials in liquids. Alan provided early feedback that because it is an informative annex, that being informative should address the NEMA perceptions of the need for a new required test. Likewise, at the conclusion of the discussion, there was no opposition to resolving the NEMA comments through further discussion by the CRG.

The Chair then updated the WG that the analysis method proposed by Alan Sbravati for inclusion in C57.100, but which was not voted to be included in the WG ballot, was discussed in the new WG to amend Annex B of IEEE 1276 that it was within the scope for inclusion in that document.

The Chair then summarized the final steps for the document, being a vote at the ILSC to validate that we followed procedures and that we can go to SA ballot. Sam Sharpless spoke to reinforce the need for all ILSC people in attendance were needed to assure a quorum.

The Chair concluded that likely no meeting will be needed this Fall (2022), as the document will either be in comment resolution or will be complete. The meeting was adjourned at 12:10 p.m.

Respectfully submitted,

Roger Wicks  
Chair

Kevin Biggie  
Secretary

*Attendance WG C57.100 Spring 2022 Meeting (66 attendees – 25 Members, 41 Guests):*

<b>Last/Family/ Surname</b>	<b>First/Given Name</b>	<b>Affiliation / Company Name</b>	<b>Status / Role</b>
Alahmed	Alex	Evergy - Wolfcreek	Guest
Avanoma	Onome	MJ Consulting	Member
Bargone	Gilles	FISO Technologies Inc.	Member
Berube	Jean-Noel	Rugged Monitoring Inc.	Guest
Biggie	Kevin	Weidmann Electrical Technology	Secretary
Burke	David	Xcel Energy	Guest
Chambers	Stuart	Powertech Labs Inc.	Member
Chiang	Solomon	The Gund Company	Member
Cordova	Olivia	Bureau of Reclamation	Guest
Davoudi	Pouneh	Delta Star Inc	Guest
Diaz	Cesar	Eaton	Guest
Dulac	Hakim	Qualitrol Company LLC	Guest
Ermakov	Evgenii	Hitachi Energy	Guest
Espindola	Marco	Hitachi Energy	Guest
Frimpong	George	Hitachi Energy	Member
Fyrer	Bob	DuPont	Guest
Garza	Hector	Orto de Mexico	Guest
Hoffman	Saramma	PPL Electric Utilities	Member
Holden	Andrew	Ergon, Inc.	Guest
Hopkinson	Philip	HVOLT Inc.	Guest
Kaineder	Kurt	Siemens Energy	Member
Koshel	Anton	Delta Star Inc.	Guest
Lachman	Mark	Doble	Guest
Larison	Andrew	Hitachi Energy	Guest
Levin	Aleksandr	Weidmann Electrical Technology	Member

Li	Chao	EATON Corporation	Member
Lucas,P.E.	Tiffany	SPX Transformer Solutions, Inc.	Guest
Lugge	Andrew	Hitachi Energy	Guest
Malde	Jinesh	M&I Materials Inc.	Member
Mani	Kumar	Duke Energy	Guest
Mani	Balakrishnan	Virginia Transformer Corp.	Guest
Martinez	Rogelio	Georgia Transformer	Member
Matson	Tom	Xcel Energy	Guest
Mbouombouo	Mama	Hitachi Energy	Guest
McBride	Brian	Cargill, Inc.	Member
McCullough	Douglas	Maxima / Hyundai	Guest
McKinney	Ken	UC	Guest
Montpool	Rhea	Schneider Electric	Guest
Morales-Cruz	Emilio	Qualitrol Company LLC	Member
Munoz Molina	Martin	Orto de Mexico	Guest
Niroula	Ashmita	Ergon, Inc.	Member
Parkinson	Dwight	EATON Corporation	Guest
Pointner	Klaus	Trench Austria GmbH	Guest
Portillo	Alvaro	Ing. Alvaro Portillo	Guest
Prevost	Thomas	Weidmann Electrical Technology	Member
Prince	Jarrold	ERMCO	Guest
Riggins	Benjamin	Xcel Energy	Guest
Rocque	Tim	SPX Transformer Solutions, Inc.	Guest
Sankarakurup	Dinesh	Duke Energy	Member
Sarkar	Amitabh	Virginia Transformer Corp.	Member
Sbravati	Alan	Cargill, Inc.	Member
Schappell	Steven	SPX Transformer Solutions, Inc.	Member
Schneider	Jeff	Power Partners	Guest
Schweiger	Ewald	Siemens Energy	Guest
Selvaraj	Pugal	Virginia Transformer Corp.	Guest
Shannon	Michael	Rea Magnet Wire	Guest



Sharpless	Samuel	Rimkus Consulting Group	Member
Stankes	David	3M	Member
Theisen	Eric	Metglas, Inc.	Guest
Tostrud	Mark	Dynamic Ratings, Inc.	Member
Vyas	Pragnesh	Sunbelt-Solomon Solutions	Member
Wang	Evanne	DuPont	Member
Washburn	Alan	Burns & McDonnell	Guest
Wicks	Roger	DuPont	Chair
Williams	Trenton	Advanced Power Technologies	Guest
Zaman	Malia	IEEE	Guest

## H.5.3 C57.154 IEEE Standard for Liquid Immersed Transformers Designed to Operate at Temperatures Above Conventional Limits Using High-Temperature Insulation Systems – Richard Marek

Chair, Richard Marek  
Vice-Chair, Anastasia O'Malley  
Secretary, Ewald Schweiger

- No meeting was held in Denver since the document is in ballot
- 5 WG meetings total
- PAR expiration date: 31 December 2022
- Ballot closed Thursday, November 18
- Ballot stats:
  - Disapprovals: 3
  - Total comments: 64
- Ballot comment resolution stats:
  - Accepted or revised: 54
  - Rejected: 10 (including 2 negative comments)

The ballot resolution group lead by Kevin Biggie did an excellent job and all the comments have been addressed and resolved. The request to Recirculate the Ballot for IEEE PC57.154 has been submitted to the Program Manager. The initial feedback was received that some procedural formalities on addressing the comments are needed. This work is in progress and when completed the request for the recirculation process will be submitted again to the Program Manager. After review and approval, the recirculation will be sent to the Standards Association Ballot group members after approval of the recirculation by the Program Manager.

We want take the opportunity to thank all for their efforts and contribution in creating this document.

Ewald Schweiger, Secretary

**H.5.4 C57.162 Guide for the Interpretation of Moisture Related Parameters  
in Liquid Immersed Transformers and Reactors – Tom Prevost**

Chair: Tom Prevost

Secretary: Deanna Woods

Meeting took place at Denver Hyatt Regency Hotel, 9:30 AM March 28, 2022

Attendance Members 31 out of 58

Guest 73

A quorum of the working group members was met with 31 out of 58 members present.

The agenda was approved as presented.

The minutes of the Spring 2021 virtual meeting were approved. (We did not meet in Fall 2021)

There was a call for patents. No one had a claim.

The copy rights policy was presented, there were no questions or comments.

The chair reviewed the project timeline:

- Original PAR was approved on August 23, 2013
- A Two Year PAR extension was approved by NESCom in December 2020.
  - Project approved until Dec 31, 2022
- PAR revision to revise title, scope and purpose to address only liquid immersed transformers was approved by NESCom in January 2021.
- Balloting needs to start after this meeting.

The chair presented the status of the document:

- Draft 7 has been compiled and edited by editor- Stephanie Denzer
- Draft 7 has been circulated to TF chairs for review and comments
- Comments have been incorporated into draft.
- Proposal is to go to ballot with this draft.

Bruce Forsyth made a motion with Stuart Chambers seconding the motion.....

“We approve Draft 7 of PC57.162 to move the draft standard to the sponsor for IEEE Standards Sponsor ballot”

In order to move to ballot 2/3 of the members present needed to approve. 28 members approved the motion, so it passed. There were no disapprovals or abstentions.

Bruce Forsyth made a motion with Stuart Chambers seconding the motion.....

“Move to form a Comment Resolution Group comprised of Officers and Task Force Chairs”

The motion passed with unanimous approval.

The Comment Resolution Group will include the following individuals:

Tom Prevost, Valery Davydov, Deanna Woods, Stephanie Denzer, Oleg Roizman, George Frimpong, Poorvi Patel, Ron Hernandez, Bob Razor

Meeting adjourned at 10:30 AM

**Attendance:**

<b>First Name</b>	<b>Last Name</b>	<b>Member</b>
Raj	Ahuja	
Claude	Beauchemin	
Enrique	Betancourt	x
Paul	Boman	x
Stephan	Brauer	
Edward	Casserly	x
Stuart	Chambers	x
Luiz	Cheim	
Solomon	Chiang	x
Larry	Christodoulou	x
James	Cross	
Valery	Davydov	
Sami	Debass	x
Stephanie	Denzer	x
Don	Dorris	
Hakim	Dulac	x
Roger	Fenton	
Bruce	Forsyth	x
George	Frimpong	x
James	Gardner	
Ismail	Guner	
Ronald	Hernandez	
Robert	Kinner	
Zan	Kiparizoski	x
Aleksandr	Levin	x
Jinesh	Malde	x
Kumar	Mani	x
Richard	Marek	
Terence	Martin	
Thomas	Melle	x
Hali	Moleski	
Emilio	Morales-Cruz	x
Parminder	Panesar	
Poorvi	Patel	x
Oscar	Pinon	
Thomas	Prevost	x
Jimmy	Rasco	
Robert	Rasor	
Timothy	Raymond	
Afshin	Rezaei-Zare	x

Diego	Robalino	x
Oleg	Roizman	
Mickel	Saad	x
Roderick	Sauls	
Pugal	Selvaraj	x
Samuel	Sharpless	x
K. Shane	Smith	
Brian	Sparling	x
Mike	Spurlock	
Paul	Su	
Mark	Tostrud	x
Alwyn	Van Der Walt	x
Sukhdev	Walia	
David	Wallach	x
Evanne	Wang	x
Peter	Werelius	
Roger	Wicks	x
Deanna	Woods	x

### **H.5.5 C57.165 IEEE Guide for Temperature Measurements for Liquid Immersed Transformers and Reactors – Mark Tostrud**

Officers

Chair – Mark Tostrud

Vice Chair/Secretary – Zan Kiparizoski

1. Meeting Date and Time: 03/29/2022 at 9:30-10:45am CST

Meeting started at 9:30am

2. Call for essential patents

The patent slides were shared on screen and a request for any known patents that were essential to the work of the Working Group was made. There were no responses to the request.

3. Reviewed IEEE-SA Copyright Policy

The copyright policy slides were shared on screen and a request for any known copyright issues was made. One member has previously submitted copyright document for his work.

### 4. Chairs remarks

Working group approved performing a straw ballot of the guide in December 2021. The latest draft D6.4 along with a form to submit comments/feedback was mailed to all members and guests. The straw ballot will close on 4/30/2022 at 11:59pm.

### 5. Attendance

- There were 40 attendees in the meeting
  - 14 members
  - 26 guests
  - 2 guests requested membership
- Quorum check
  - Quorum was achieved
  - The poll showed 14 of 20 members were present

### 6. Approval of the agenda and minutes

- The Chair requested a motion for approval of the meeting agenda
  - Motion – Sam Sharpless
  - 2<sup>nd</sup> – Trent Williams
  - Unanimous approval
- The Chair requested a motion for approval of the minutes from fall 2021 virtual meeting
  - Motion – Gilles Bargone
  - 2<sup>nd</sup> – Ryan Musgrove
  - Unanimous approval

### 7. Call for ballot resolution group members

Chair asked to form ballot resolution group, with comments to be submitted by April 30. Chair asked for volunteers for comments resolution beside working group officers. Following members volunteered to be part of the comment resolution group:

- Trent Williams
- Hakim Dulac
- Ryan Musgrove
- Gilles Bargone
- Brad Staley

Virtual meetings will be held to resolve comments as needed. WG shall approve the document before it could be sent to the subcommittee.

### 8. Old Business

- No old business

### 9. New Business

- No new business

10. The meeting adjourned at 10:00

- Motion – Jean Noel Berube
- 2<sup>nd</sup> – Hakim Dulac

11. Minutes

The minutes were recorded by Zan Kiparizoski – Secretary and reviewed by Mark Tostrud – Chair

<b>WG PC57.165 – Participation List, Denver, spring 2022 Meeting</b>			
<b>Role</b>	<b>First Name</b>	<b>Last Name</b>	<b>Company</b>
Member	Gilles	Bargone	FISO Technologies Inc.
Member	Jean-Noel	Berube	Rugged Monitoring Inc.
Member	Juan	Castellanos	Prolec GE
Member	Hakim	Dulac	Qualitrol Company LLC
Member	Zan	Kiparizoski	Howard Industries
Member	Balakrishnan	Mani	Virginia Transformer Corp.
Member	Martin	Munoz Molina	Orto de Mexico
Member	Ryan	Musgrove	Oklahoma Gas & Electric
Member	Parminder	Panesar	Virginia Transformer Corp.
Member	Steven	Schappell	SPX Transformer Solutions, Inc.
Member	Stefan	Schindler	Maschinenfabrik Reinhausen
Member	Samuel	Sharpless	Rimkus Consulting Group
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Member	Trenton	Williams	Advanced Power Technologies
Guest	Nabi	Almeida	Prolec GE
Guest	Dave	Burke	Xcel Energy
Guest	Mark	Cheatham	GE
Guest	Michael	Dahlke	Central Moloney Inc.
Guest	Cezar	Diaz	Eaton Corporation
Guest	Zack	Draper	
Guest	Florin	Faur	SPX Transformer Solution
Guest	Hector	Garza	Orto de Mexico
Guest	Orlando	Giraldo	H-J family
Guest	Bridget	Havens-Spillars	Ameren
Guest	Gary	Hoffman	Advanced Power Technologies
Guest	Egon	Kirchheimayer	Siemens Energy
Guest	Angela	Leigl	Eaton Corporation
Guest	Tiffany	Lucas	SPX Transformer Solutions, Inc.
Guest	Lee	Matthwes	Howard Industries
Guest	Kent	Miller	T&R electric

Guest	Emilio	Morales	Qualitrol Company LLC
Guest	Matthew	Pinard	Weidmann Electrical Technology
Guest	Homero	Portillo	Advanced Power Technologies
Guest	Timothy	Rinks	Delta Star Inc.
Guest	Albert	Sanchez	Knoxville Utility Board
Guest	Brian	Sparling	Dynamic Ratings, Inc.
Guest	Timothy	Tillery	Howard Industries
Guest	Matthew	Webb	GE
Guest	Bill	Whitehead	HzScan
Guest	Malia	Zaman	IEEE

### **H.5.6 C57.169 Maximum Winding Temperature Rise in Liquid-Filled Transformers (PC57.169 replacing IEEE 1538) – Scott Digby**

Did not have a WG meeting since document is in ballot. Going through mandatory editorial changes. Going through balloting soon. Formed a comment resolution group. PAR does not expire till 2023. Anyone that wants to join the ballot group can.

### **H.5.7 Amendment of 1276 Guide for the Application of High Temperature Insulation Materials in Liquid-Immersed Power Transformers (Annex B & D) – Kevin Biggie**

#### **Monday, 28 March 2022, 1:45pm – 3:00pm (MDT) – Spring 2022 Meeting (in-person)**

- 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-two (52) attendees were present with twenty-two (22) requesting and granted membership as this is the first WG meeting. Thus, including the Chair, Vice-Chair and Secretary, total WG membership is twenty-five (25) members.

The Chair notes that this work is 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, and no copyright comments were provided by any of the attendees. The Chair continues with the agenda, which is noted below if input or comments were received:

#### **Background**

- The Chair explains the need for the previous TF and current WG, and reviews Annex B with the WG. He clarifies that this WG is to only revise Annex B and D, and not the IEEE 1276 document – and that it is important to note that this is an amendment PAR and not a revision PAR.
- Roger Wicks (DuPont) notes that the information from Annex B consisted of two sources, which were from IEEE 1276 and IEEE C57.154 and that the purpose of this work is to update older information.
- No additional comments were received for the remaining portions of Annex B.

#### **Potential Amendment Material #1**

- Alan Sbravati (Cargill) notes that the main point of the material is the additional data points on the graphs with minor changes within the text. He also notes that as a result of the last IEEE C57.100 vote, an annex of additional data analysis information can be included also.
- Bruce Forsyth (Bruce Forsyth & Associates LLC) asks Alan to clarify the addition of the annex mentioned in his previous comment. Alan clarifies that the WG for C57.100 decided to not include his proposed annex within C57.100 but recommended that the WG for Annex B consider his annex. Kevin clarified not as a new annex in 1276, but rather as a new addition within Annex B.

### Potential Amendment Material #2

- The Chair notes that this amendment material contains information from additional studies that have been conducted following the procedure from IEEE C57.2011. The additional information that covers aging of ester fluids and other alternative liquids shall need to be reviewed and discussed in this WG.
- Lance Lewand (Doble) asks if synthetic esters will be a part of Annex B. The Chair responds that any aging examples can now be included as this is an amendment, including synthetic esters.
- Lance Lewand (Doble) comments that “moisture” is not the correct term as it can apply to chemicals other than water. He notes that “moisture” should be re-termed to “water” in the entirety of Annex B in the revision. Jinesh Malde (M&I Materials) agrees.
- Alan Sbravati (Cargill) comments that the additional annex he was planning on having for IEEE C57.100 was to address the first point of following the 2011 version. He notes that many of the new individual studies followed the methodology, but each study showed different results. He also notes that the methodology was not properly described in the method and that 15,000 hours is an average from many materials.
- Joe Watson (JD Waterson & Associates) asked if the work of this WG might be relevant in the short-term such as for heat run testing, in particular with regards to bubbling, as it may apply to his work with the volts per hertz group. Alan (Cargill) notes that bubbling is rather covered instead in Annex A of C57.91 and again in Annex B of IEC 60776 Part 14.

### Potential Amendment Material – Others

- Roger Wicks (DuPont) comments that the aramid mineral oil data from Annex B today is from the work that was originally generated by ESSERCO from the sealed-tube testing from GE that was in IEEE 1276. The data he would like to add is additional data using the dual-temperature methodology on a mineral oil and Nomex® paper.
- Jinesh Malde (M&I Materials) comments that IEEE C57.154 is removing thermal classes based on the type of liquid and suggested adding a table of thermal classes of insulation systems as the top liquid temperature can impact performance of the liquid.
- Sam Sharpless (Rimkus Consulting) questions the previous comment as he wants to make sure the WG is not getting out of scope and producing a new loading guide: is this table of examples or consisting of data? Jinesh responds that this summary table was already discussed in IEEE C57.154 and that this table would note that these are examples based on specific solid and liquid insulation classes (e.g., mineral oil in thermally upgraded kraft).

### Update on PAR approval

- The Chair shares the dates of approval and expiry for the PAR and briefly reviews the PAR with the WG.
- Sam Sharpless (Rimkus Consulting) notes that if anyone has additional data, it should be brought to the next meeting as decisions should be made early. This includes any data on the verge of being published or already published. Jinesh Malde (M&I Materials) suggests that participants should call out what data is going to be published so that the WG can set a deadline.
- The Chair notes that in the Fall 2022 meeting, the scope to guide the WG shall be defined.



- Jinesh Malde (M&I Materials) questions if the additional annex that Alan Sbravati (Cargill) mentioned earlier in the meeting belongs in the IEEE 1276 discussion or open for discussion at this WG. The Chair notes that the proposed annex did not include Alan's in the IEEE C57.100 draft but can be considered by this WG as this group can consider recommendations made by another WG but not bound by this recommendation.

The Chair opens the floor up for comments and questions:

- The Chair clarifies that amendments to any part of this annex can include additions, subtractions, and changes. Additionally, any applicable data should be brought forth to his attention prior to the next meeting.
- Alan Sbravati (Cargill) notes that he would like to send examples of insulation system thermal classes to include in the amendment for consideration. Alan shared a proposed insulation system thermal class table subsequently after the meeting for future consideration.

Meeting adjourned at 2:49pm

Respectfully submitted,

Kevin Biggie, Chair     George Frimpong, Vice-Chair     Evan Wang, Secretary

Attendance WG IEEE 1276 Annex B & D Meeting (3/28/2022):

- Attendees: 52
- Attendees requesting & granted membership: 22

<b>Last/Family/ Surname</b>	<b>First/Given Name</b>	<b>Affiliation / Company Name</b>	<b>Status / Role</b>
Almeida	Nabi	Prolec GE	Member
Bargone	Gilles	FISO Technologies Inc.	Guest
Beaudoin	Jason	Weidmann Electrical Technology	Guest
Berube	Jean-Noel	Rugged Monitoring	Guest
Biggie	Kevin	Weidmann Electrical Technology	Chair
Bonn	Mike	Soltex	Guest
Botti	Michael	Hyosun Hico	Guest
Bradshaw	Jeremiah	Bureau of Reclamation	Guest
Burks	David	Xcel Energy	Guest
Castellanos	Juan	Prolec GE	Member
Chambers	Stuart	Powertech Labs	Member
Christodoulou	Larry	Electrical Power Service	Guest
Coker	Anthony	M&I Materials	Member

Cordova	Olivia	Bureau of Reclamation	Guest
Dolloff	Paul	East Kentucky Power	Guest
Door	Jeffrey	The H-J Family of Companies	Guest
Downey	Andy	Prolec GE Waukesha	Member
Forsyth	Bruce	Bruce Forsyth & Associates LLC	Guest
Frimpong	George	Hitachi Energy	Vice-Chair
Harper	Robert	Soltex	Guest
Hopkinson	Philip	Hvolt	Member
Jakob	Karl	Cargill	Guest
Kaineder	Kurt	Siemens Energy	Member
Kiparizoski	Zan	Howard Industries	Member
Kotula	John	Dominion Energy	Guest
Kulasek	Krzysztof	Hitachi Energy	Guest
Lewand	Lance	Doble	Member
Li	Chao	Eaton	Member
Lucas	Tiffany	Prolec GE Waukesha	Member
Malde	Jinesh	M&I Materials	Member
Mani	Balakrishnan	Virginia Transformer	Member
McBridge	Brian	Cargill	Member
McCullough	Douglas	Maxima-Hyundai	Guest
Oakes	Stephen	WEG Transformers	Member
Panesar	Parminder	Virginia Transformer	Member
Puleo	Gerard	M&I Materials	Guest
Reiss	Tony	Custom Materials Inc.	Member
Sbravati	Alan	Cargill	Member
Schrammel	Alfons	Siemens Energy	Guest
Schweiger	Ewald	Siemens Energy	Member
Shalabi	Jaber	VanTran Transformer	Guest
Shannon	Michael	REA Magnet Wire	Member
Sharpless	Samuel	Rimkus Consulting	Member
Tillery	Tim	Howard Industries	Guest

Tostrud	Mark	Dynamic Ratings	Guest
Traut	Alan	Howard Industries	Guest
Von Gemmingen	Richard	Dominion Energy	Guest
Wang	Evanne	DuPont	Secretary
Watson	Joe	JD Waterson & Associates	Guest
Weiss	Zachery	WEG Transformers	Guest
Wicks	Roger	DuPont	Member
Yadav	Rahul	DuPont	Guest

## H.6 Old Business

## H.7 New Business

## H.8 Adjournment

Motion was made by Phil Hopkinson to adjourn the meeting. It was seconded by Tom Prevost. Hearing no objection, the meeting was adjourned at 9:15 AM CST.

### Attendance:

Members (61)

<b>Last Name</b>	<b>First Name</b>	<b>Company</b>
Sharpless	Samuel	Rimkus Consulting Group
Malde	Jinesh	M&I Materials Inc.
Antosz	Stephen	Stephen Antosz & Associates, Inc
Arteaga	Javier	Hitachi Energy
Avanoma	Onome	MJ Consulting
Ayers	Donald	Ayers Transformer Consulting
Ballard	Robert	DuPont
Bargone	Gilles	FISO Technologies Inc.
Beaster	Barry	H-J Family of Companies
Biggie	Kevin	Weidmann Electrical Technology
Boettger	William	Boettger Transformer Consulting LLC
Calitz	David	Siemens Energy
Castellanos	Juan	Prolec GE
Chakraborty	Arup	Delta Star Inc.
Chambers	Stuart	Powertech Labs Inc.
Chiang	Solomon	The Gund Company

Digby	Scott	Duke Energy
Forsyth	Bruce	Bruce Forsyth and Associates PLLC
Frimpong	George	Hitachi Energy
Frotscher	Rainer	Maschinenfabrik Reinhausen
Garcia Wild	Eduardo	Siemens Energy
Griesacker	Bill	Duquesne Light Co.
Hoffman	Saramma	PPL Electric Utilities
Hopkinson	Philip	HVOLT Inc.
Jordan	Stephen	Tennessee Valley Authority
Joshi	Akash	Black & Veatch
Kaineder	Kurt	Siemens Energy
King	Gary	Howard Industries
Kiparizoski	Zan	Howard Industries
Kirchenmayer	Egon	Siemens Energy
Levin	Aleksandr	Weidmann Electrical Technology
Li	Weijun	Braintree Electric Light Dept.
Mani	Kumar	Duke Energy
Miller	Kent	T&R Electric Supply Co.
Murray	David	Tennessee Valley Authority
Nambi	Shankar	Bechtel
Patel	Poorvi	Electric Power Research Institute (EPRI)
Parkinson	Dwight	EATON Corporation
Prevost	Thomas	Weidmann Electrical Technology
Reed	Scott	MVA
Saad	Mickel	Hitachi Energy
Sankarakurup	Dinesh	Duke Energy
Sarkar	Amitabh	Virginia Transformer Corp.
Sbravati	Alan	Cargill, Inc.
Schiessl	Markus	SGB
Schneider	Jeffrey	Power Partners/Spire Power Solutions
Schweiger	Ewald	Siemens Energy
Skinger	Kenneth	Scituate Consulting, Inc.
Som	Sanjib	Pennsylvania Transformer
Staley	Brad	Salt River Project
Szczechowski	Janusz	Maschinenfabrik Reinhausen
Tanaka	Troy	Burns & McDonnell
Tostrud	Mark	Dynamic Ratings, Inc.
Traut	Alan	Howard Industries
Van Der Walt	Alwyn	Electrical Consultants, Inc.
Varghese	Ajith	SPX Transformer Solutions, Inc.
Vyas	Pragnesh	Sunbelt-Solomon Solutions
Wallach	David	Duke Energy
Wang	Evanne	DuPont

Whitehead	William	H2scan Corporation
Wicks	Roger	DuPont

## Guests (86)

Adams	Kayland	SPX Transformer Solutions, Inc.
Alahmed	Alex	Energy-Wolfcreek
Almeida	Nabi	Prolec GE
Anderson	Gregory	GW Anderson & Associates, Inc.
Arnold	Elise	SGB
Beaudoin	Jason	Weidmann Electrical Technology
Benzler	Olle	Megger
Botti	Michael	Hyosung HICO
Bradshaw	Jeremiah	Bureau of Reclamation
Brown	Darren	Howard Industries
Burge	David	Xcel Energy
Carrizales	Juan Alfredo	Prolec GE
Christodoulou	Larry	Electric Power Systems
Coker	Anthony	M&I Materials Inc.
Cordova	Olivia	Bureau of Reclamation
Cruz Valdes	Juan Carlos	Prolec GE
Dahlke	Michael	Central Moloney
Davis	Eric	Burns & McDonnell
Davoudi	Pouneh	Delta Star Inc.
DeRouen	Craig	ERMCO
Diaz	Cesar	EATON Corporation
Dillon	Nikolaus	Dominion Energy
Dolloff	Paul	East Kentucky Power Cooperative
Downey	Andy	Prolec GE
Draper	Zachory	Delta-X Research
Ermakov	Evgenii	Hitachi Energy
Espindola	Marco	Hitachi Energy
Frye	Richard	EATON Corporation
Gamboa	Jose	H-J Family of Companies
Gragert	Jeffrey	Xcel Energy
Hakim	Shamaun	WEG Transformers USA Inc.
Havens	Bridget	Ameren
Heiden	Kyle	EATON Corporation
Hollrah	Derek	Burns & McDonnell
Issack	Ramadan	American Electric Power
Jensen	Nick	Delta Star Inc.
Kazmierczak	Jerzy	Hitachi Energy

Knapp	Evan	EATON Corporation
Koshel	Anton	Delta Star Inc.
Kutzleb	Michelle	TJH2b Analytical Services
Larison	Andrew	Hitachi Energy
Leigl	Angela	EATON Corporation
Li	Chao	EATON Corporation
Lucas, P.E.	Tiffany	SPX Transformer Solutions, Inc.
Matson	Tom	Xcel Energy
Mbouombouo	Mama	Hitachi Energy
McBride	Brian	Cargill, Inc.
Montpool	Rhea	Schneider Electric
Morales-Cruz	Emilio	Qualitrol Company LLC
Musgrove	Ryan	Oklahoma Gas & Electric
Nesvold	Brady	Xcel Energy
Nunez	Arturo	
Patel	Nitesh	Hyundai Power Transformers USA
Pepe	Harry	Phenix Technologies, Inc.
Pinard	Matthew	Weidmann Electrical Technology
Pollaro	Dominic	NASS
Portillo	Homero	Advanced Power Technologies
Posadas	Daniel	Prolec GE
Prince	Jarrod	ERMCO
Rocque	Tim	SPX Transformer Solutions, Inc.
Roussell	Marnie	Entergy
Sahin	Hakan	Virginia/Georgia Transformer
Sanchez	Albert	Knoxville Utilities Board
Schappell	Steven	SPX Transformer Solutions, Inc.
Schindler	Stefan	Maschinenfabrik Reinhausen
Schrammel	Alfons	Siemens Energy
Selvaraj	Pugal	Virginia Transformer Corp.
Sen	Cihangir	Duke Energy
Sharp	Michael	Trench Limited
Shingari	Avijit	Pepco Holdings Inc.
Shull	Stephen	BBC Electrical Services, Inc.
Simons	Andre	JFE Shoji Power Canada Inc.
Sparling	Brian	Dynamic Ratings, Inc.
Spurlock	Mike	Spurlock Engineering Services, LLC
Stankes	David	3M
Stechschulte	Kyle	American Electric Power
Steineman	Andrew	Delta Star Inc.
Sweetser	Charles	OMICRON electronics Corp USA
Taylor	Marc	JFE Shoji Power Canada Inc.

Vantol	Robert	Commonwealth Associates
Washburn	Alan	Burns & McDonnell
Webb	Bruce	Knoxville Utilities Board
Weiss	Zachery	WEG Transformers USA Inc.
Whitten	Christopher	Hitachi Energy
Zaman	Malia	IEEE
Zemanovic	Kyle	EATON Corporation

Guests requesting membership:

Nabi Almeida, Kyle Stechschulte and Chao Li

Respectfully submitted,

Jinesh Malde

Vice-Chair, Insulation Life Subcommittee

## **ANNEX I**

### **Meetings Planning Subcommittee**

See Appendix 9 for the Meeting Planning Subcommittee report.



## **Annex J Performance Characteristics Subcommittee (PCS)**

**March 30<sup>th</sup>, 2022, Hyatt Regency Convention Center, Denver, CO**

### **UNAPPROVED MINUTES**

**Chair: Rogerio Verdolin**

**Vice Chair: Sanjib Som**

**Secretary: Kris Zibert**

#### **J.1 Introduction / Attendance**

Quorum was not achieved, however, later in the meeting quorum was achieved with 61 members present (52% in attendance). In addition, 65 guests were present at the meeting. The total attendance at the meeting was 127. 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 Charlotte, NC, October 16-20, 2022.

#### **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.

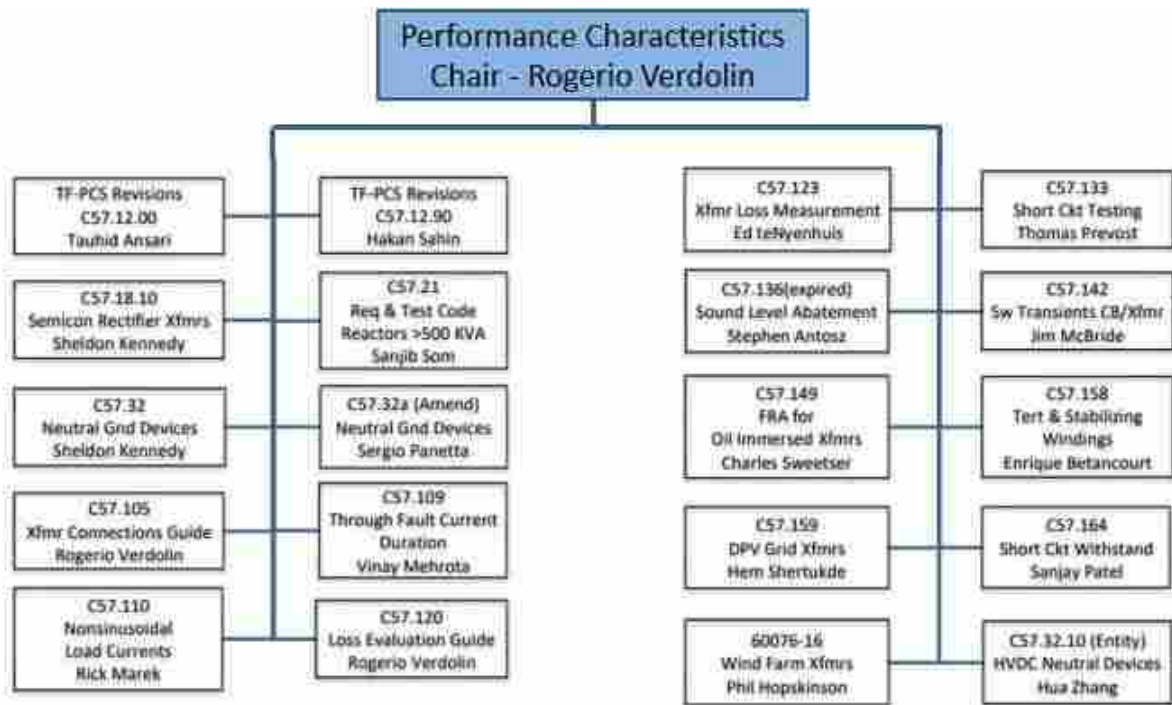
The Vice Chair asked anyone with new business to submit in writing prior to the meeting.

**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
- C57.105 – Transformer connections guide – R. Verdolin
- C57.109 – Through Fault Current Duration – V. Mehrotra
- 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
- C57.142 – 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-new – Short Circuit Withstand (in development) – S. Patel
- 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 (WG in draft development)
  - C57.149 SFRA Guide (WG in draft development)
- 2023 PAR's
  - C57.142 Transient Guide (In Sponsor Ballot)
- 2024 PAR's
  - C57.105-2019/Cor 1 (New WG)
- 2025 PAR's
  - C57.136 Audible Sound Guide (New WG)
  - C57.141 Entity WG Guide for Detection, Monitoring and Evaluation of Winding Deformation

### **Status of Standards without active PARs**

- C57.32-2015 – Neutral Grounding Devices (2025)
- 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 – Xfrmr 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 Sue
- Must track attendance.
- 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 1 Member missed the past 2 meetings and have been moved to “Guest” status:

- None

Please contact Sanjib by sending him a message or see him after the meeting if you believe your membership status is not accurate.

#### **Attendance / Membership – New Members**

These 7 former Guests requested membership at the Fall 2019 meeting and have attended the past 2 of the last 3 meetings:

- |                  |                 |
|------------------|-----------------|
| ▪ Amitabh Sarkar | ▪ Hakan Sahin   |
| ▪ Harry Pepe     | ▪ Michael Sharp |

**Welcome the New Members: We look forward to your contributions to the Subcommittee**

#### **Attendance / Membership – Quorum determination**

- Current breakdown of the Subcommittee:
  - 117 Members
  - 59 are needed for a quorum
- Quorum was established.

#### **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 passed by unanimous consent.

#### **J.4 Approval of Last Meeting Minutes**

The Chair presented the minutes of meeting held in the Fall 2022 – November 28<sup>th</sup>, 2021 and entertained a motion to approve. The minutes had been sent to the members by email several weeks prior to the meeting. 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** **C. Sweetser**
- **TF PCS Audible Sound Revision to Test Code** **R. Girgis**
- **TF PCS Continuous Revisions to C57.12.00** **T. Ansari**
- **TF PCS Continuous Revisions to Test Code C57.12.90** **H. Sahin**
- **WG HV & EHV Breaker & Transformer Sw. Transients C57.142** **J. 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

- 32 in attendance, 31 members on the roster, 10 members attended, a quorum was not achieved.
- Revision is completed; grounding, connections, and analysis. Ready for WG straw ballot. PAR expires this year.
- Jim McBride presented on the topic of on-line FRA, a shunt reactor example was presented

### 2) TF on PCS Continuous Revisions to C57.12.00

**T. Ansari**

Meeting Date / Time : March 27th, 2022, @ 3:15PM to 4:30PM

- 75 total attendees, consisting of 33 members and 42 guests. The TF achieved a quorum (33 members required).

#### Highlights:

- Old Business
  - Inclusion of Core information on Nameplate
    - The proposed addition to row # 25 and 26 in table 6 of C57.12.00 passed with 22 members in favor, 1 opposed, and 10 abstain.
  - Clarification on  $\pm 0.5\%$  tolerance of ratio of three-phase transformer
    - The discussion was not conclusive due to no clear understanding of phase-to-phase ratio tolerance
  - A motion was initiated to form a study group (task force) to review the sec 9.1 of C57.12.00 and provide recommendation on phase-to-phase tolerance to this task force by Fall 2022. 14 voted in favor, 9 oppose and 5 abstain. This totaled 28 members. A second quorum check (by raise of hand) was conducted and found ; the quorum was not maintained. Hence the motion did not pass.
  - This discussion will continue in Fall 2022 meeting
  - Meeting adjourned at 4:30PM
  - Motion to vote in Sub committee: Add row # 25 and 26 with Core information in table 6 of C57.12.00

Row	Nameplate A	Nameplate B	Nameplate C
25	-	-	Core Design --Shell or Core form
26	-	-	Core Type -Number of limbs (wound), Shell Type - D type , 7 limbs, or others

- T. Ansari asked that the motion be surveyed among the subcommittee.

### 3) **WG on Noise Guide C57.136**

**S. Antosz**

- The WG met as scheduled. The meeting was attended by 25 members (out of 46), and 35 guests, for a total of 60 persons. There were 5 requests for membership. A quorum was established with  $25 / 46 = 54\%$  attendance. The agenda was unanimously approved as was the unapproved minutes from the previous meeting (Virtual meeting, fall of 2022).
- Chairman Stephen Antosz presided over the meeting with Dr. Ramsis Girgis being the Vice-Chair, and Mats Bernesjo as Secretary.
- The Chair welcomed the audience, reviewed the agenda, and updated about the status of the latest circulated revision of the Guide, Draft 3.
- Dr. Girgis presented new additions to Draft 3. Some of these were in response to previous requests from members and guests, and some were topics that were yet to be added to the Guide.
- The ensuing discussion resulted in several requests for new or additional topics of information to be included in the guide, and these will be implemented as much as possible. Details are in the Minutes.
- There are some final updates and editorial work to be made to the Introduction and Bibliography.
- A new draft will be circulated before the Fall 2022 meeting.
- The document is nearing completion and hopefully will be finalized before the end of 2022, and be able to be open for IEEE-SA ballot.

### 4) **TF on PCS Continuous Revisions to Test Code C57.12.90**

**H. Sahin**

- Meeting started at 9:30 am MDT. There were 83 attendees. Quorum was not achieved as we had only 22 members out of 70 listed members; needed 35
- Agenda and previous meeting minutes could not be approved. Meeting proceeded for information purposes, as the agenda was emailed ahead of the meeting.
- Updated the TF on the status of the PCS surveys for the below revisions and the new clauses to C57.12.90. All below clauses had already passed the TF, and were surveyed within the PCS, and passed!
- Revision to the “Ratio Test Methods” under section 7.3
- Revision to the “Ratio tests voltage and frequency” under section 7.1.2
- Revision to the “Number of short circuit tests” under section 12.3.4
- *New* test sections 8.7 & 9.6 for “LTC tests”
- There will be continuous clarifications for some of the above clauses, including online meetings, and the TF will be updated.
- No critical items or motions to be brought up to PCS at this point
- Meeting adjourned at 10:40 am

### 6) **WG on HV & EHV Breaker & Transformer Sw. Transients C57.142 J. McBride**

- 53 total attendees, consisting of 21 members and 32 guests. The WG did not achieve a quorum.  $25 / 49$
- Agenda was approved by those present. The minutes of Fall 2021 meeting will be approved by email
- Draft 10 is under ballot. Ballot closes April 21, 2022. Ballot group consists of 179 people. Current response rate is 16% and approval rate is 89% with 28 comments.
- PAR Extension ends December 31, 2023.
- Mitigation Methods Task Force Summary:
  - Resistor-Capacitor Snubbers
  - Increasing Insulation is Key Areas with Additional Test Requirement for Special Terminated Lightning Impulse to Better Test for Field Conditions.

- Increasing Series Capacitance by Installing Shields to Improve Impulse Distribution and Reduce Series Resonance
- Introduce Internal Surge Protection to Limit Over-voltages During Resonant Conditions
- Reignition Mitigation with Controlled Switching
- Using Resistance Load During Switching to Provide Damping During the Event.
- Online Monitoring to Identify Actual Field Interactions and Identify Real World Conditions at the Transformer Terminals and Within the Transformer.
- Meeting concentrated on fourth item (internal surge protection). Presentation by J. Montanha, presented by E. Kirchenmayer. Presentation will be on the website.
- Next Meeting:  
Fall 2022 – Charlotte, NC March 29<sup>th</sup>, 2022.
- We will be discussing mitigation methods for failures associated with instrument transformers.
- The meeting was Adjourned at 4:30pm.
- P. Hopkinson had a comment about performance of single arresters vs multiple arresters across windings.

#### **7) WG PC57.32.10 Entity Guide for the Selection of Neutral-Grounding Devices for HDVC Converter Transformers**

- Email from Zhang Hua received today:  
Hello, I'm ZhangHua, the chairman of the working group of PC57 32.10 , the latest status of the standard is as follows:  
The working group has held three meetings and is currently in the status of revised draft. It is planned to hold the fourth meeting in May 2022 and form a standard draft for approval as early as the end of June.  
In addition, since the follow-up process may still be affected by COVID-19, I apply for permission to extend the implementation period of this standard for one year.  
Thank you.

#### **J.6 Unfinished (Old) Business**

- **There was no old business.**

#### **J.7 New Business**

- **A quorum check was initiated and it was found that the Subcommittee did have quorum.**
- **D. Sauer made a motion to approve the minutes. Second by W. Binder. The motion was approved by unanimous consent.**
- **D. Sauer made a motion to approve the agenda. Seconded by W. Binder. The motion was approved by unanimous consent.**
- **Discussion was had regarding what business should now be taken up.**
- **T. Ansari made a motion to add core information to nameplate as passed by TF PCS Cont. Rev. C57.12.00. T. Ansari gave background information regarding the WG's prior deliberations regarding. Seconded.**
  - R. Girgis had discussion in support.
  - J. Watson asked if applied to reactors or just power transformers. Just power transformers.
  - Motion passed by show of hands.

## **J.8 Adjournment**

- The meeting adjourned at 3:51PM.

## **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 28, 2022 0930 H

Meeting Location: Denver, Colorado

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 32 total attendees, consisting of 11 members and 21 guests. A quorum was not achieved.

#### **AGENDA**

1. Introductions and Attendance Sheets
2. IEEE-SA Standards Board Bylaws on Patents in Standards
3. Approval of Minutes from November 15, 2021 (Virtual)
4. Approval of Agenda
5. Discussions
  - a. PAR Status
  - b. Present final document to WG for comments regarding submission to PCS SC and the ballot process.
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.

11 members were present at this meeting, so quorum was not achieved.

The agenda and minutes were not approved; the WG will proceed with an email motion to approve the agenda and minutes.

CS noted that the PAR expires this year and so we need to prepare for balloting. Draft 3 is ready for ballot, however the absence of the quorum has redirected our process. We will attempt an email motion. Once successful we will submit Draft 3 to the PCS subcommittee

#### **Noted Discussions:**

Revision tasks are wrapping up with the main focus on consolidated failure modes, connection tables, and analysis. The sections are solid and in good shape.

An edit was required in the new connection table. It was associated with Delta primaries. D1 was referenced when it should have been a D11. This was noted and the correction performed.

Some new wording was submitted by and reviewed by Wes Schrom regarding grounding. It is now in Draft 3.

List of meeting participants with membership status at the end of the meeting:

Alexander Kraetge

Amitabh Sarkar



Jim McBride	Member
Rogelio Martinez	
Dan Tournoux	
Tim Rocque	
Ajith M. Varghese	
Mark Lachman	
Juan Alfredo Carrizales	
Mike Spurlock	
Daniel Weyer	Member
Nathan Jacobs	
Evan Knapp	
Rich Frye	
Poorvi Patel	Member
Evgenii Ermakov	
Diego Robalino	Member
Idvarvo Tolcachir	
Kumar Mani	Member
Wes Schrom	Member
Parminder Panesar	Member
Balakrishnan Mani	
Eric Davis	
Steve Jordan	
David Murray	
Jeff Britton	
Tony McGrail	
Adetokunbo Shsanya	
Ed teNyenhuis	
Jason Varnell	Member
Scott Reed	Member
Arup Chakraborty	Member
Charles Sweetser	Member

Respectfully submitted,

Charles Sweetser  
Chair  
C57.149 WG

## **J.9.2 TF PCS Continuous Revisions to Test Code C57.12.90**

Meeting was called to order at 9:30 AM MST, March, 2029.

### **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. Introduction of the officers
  - i. Chair: Hakan Sahin

- ii. Vice-Chair: -
- iii. Secretary: Pugal. Selvaraj
- d. Update on membership and Quorum
  - i. Poll conducted at 9:45 AM did not achieve quorum
- e. Approval of Agenda
  - i. Not Approved due to lack of Quorum

## 2. Old Business – “Ratio Test Methods” clause 7.3

Chair provided update on the status of the revisions to “Ratio Test Methods” under section 7.3. He informed the group that the revisions which was approved in our TF was sent to PCS. Below is the new revision to clause 7.3

### 7.3 Ratio test method

#### 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

#### 7.3.2 Voltmeter method (This is currently 7.3.1)

(Clause number changes and descriptions stay the same)

#### 7.3.3 Comparison method (This is currently 7.3.2)

(Clause number changes and descriptions stay the same)

Current 7.3.3 Ratio meter clause (R/R1) to be removed

Above revision was surveyed within 118 PCS members, and passed with below results:

<b>APPROVED</b>	<b>68</b>
<b>DISAPPROVED</b>	<b>1</b>
<b>ABSTAIN</b>	<b>5</b>
<b>TOTAL</b>	<b>74</b>
<b>APPROVED WITH COMMENTS</b>	<b>0</b>

There were no critical comments, and the new clause is approved to be released in the upcoming C57.12.90 revision.

## 3. Old Business - “Ratio tests voltage and frequency” under section 7.1.2

Chair provided update on the survey results and the responses received from PCS members. The revision to clause 7.1.2 had already been revised twice within the TF and the final version was approved (Refer to previous meeting minutes). Below is the revised clause which was surveyed within PCS

### **Ratio test Voltage and Frequency**

#### **CURRENT:**

##### **7.1.2 Voltage and frequency**

- The ratio test shall be made at rated or lower voltage and rated ~~or higher~~ frequency.

#### **NEW PROPOSAL:**

##### **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.

Results of the PCS survey was:

<b>APPROVED</b>	<b>64</b>
<b>DISAPPROVED</b>	<b>7</b>
<b>ABSTAIN</b>	<b>4</b>
<b>TOTAL</b>	<b>75</b>
<b>APPROVED WITH COMMENTS</b>	<b>0</b>

Chair shared some of the PCS survey comments during the meeting and below were some of the discussions:

- Ajith Varghse Commented that lower and upper limit is required for frequency
- Jeff Rifton commented to limit the upper frequency limit to 100%
- Tauhid Ansari commented that current electronic ratio measuring systems allows voltage measurements ranges from 10V to 100V. At this low voltage measuring range frequency variance may not have impact
- Sanjib Som commented that voltage ratio methods are conducted at 100V or below range for safety reasons
- Steve Antosz made a motion to revisit the section 7.1.2 as new business and Sanjib Som seconded it.
- Chair commented that, since the new revision was already approved within PCS, we will survey the motion within the TF

#### **4. Old Business – “Number of short circuit tests” under section 12.3.4**

Chair presented the proposed revisions to the “Number of short circuit tests” under section 12.3.4 along with the survey results & comments to the members. Below revision was approved within the TF and sent to PCS to be surveyed.

#### 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.

#### Proposed 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.

Chair shared the feedback comments received to the PCS survey responses. There were some discussions, which were all similar discussions made for several years. Chair commented that he will setup an online meeting with end users and subject matter experts. However, as of Spring-22 meeting, this revision is approved by the TF and also PCS to be released in the upcoming release of C57.12.90

## **5. Old Business - New proposed test sections 8.7 & 9.6 for OLTC tests**

Chair Presented the new proposed test sections for OLTC tests under section 8.7 and 9.6. These sections have been worked on for 8 years and were approved by TF members and were sent to PCS for survey.

#### **8.7 On Load Tap Changer Voltage Test**

##### **8.7.1 General**

In order to verify the performance of a transformer that has an on-load tap changer (OLTC), the OLTC shall be operated through one end-to-end 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 OLTC 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 OLTC 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 OLTC shall be operated using the motor drive but not manual rotation. The OLTC 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 Failure Detection and Acceptance Criteria**

The transformer will have passed this OLTC 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 OLTCs, the increase of the sum of H<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>2</sub> should not exceed 12 ppm for in-tank type OLTCs and 6 ppm for compartment type LTCs.
- For non-vacuum type OLTCs, or OLTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.

##### **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 gases. 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 On Load Tap Changer Current Test

### 9.6.1 General

In order to verify the performance of a transformer that has an on load tap changer (OLTC), the OLTC shall be operated through one end-to-end-to-end 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 OLTC 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 OLTC 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 OLTC shall be operated using the motor drive but not manual rotation. The OLTC 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.

### 9.6.5.3 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 gases. 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 OLTC Current 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 OLTCs, the increase of the sum of H<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>2</sub> should not exceed 12 ppm for in-tank type OLTCs and 6 ppm for compartment type LTCs.
- For non-vacuum type OLTCs, or OLTCs filled with a liquid other than mineral oil, the determination of acceptance criteria is through sound only and there is not a limit for increase in gases.

### 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.

New sections were sent to 188 PCS members for survey, and the results as:

APPROVED	56
DISAPPROVED	9
ABSTAIN	5
TOTAL	70
APPROVED WITH COMMENTS	0

Survey was sent to 118 members of the PCS

Even though the new sections were approved by PCS as well, Chair presented 4 slides prepared by Alexander Winter from HighVolt and Rainer Frotshcer from Reinhausen. These slides were focusing on the amount of time it would take to perform the test under load due to capacitor bank adjustments. Alex and Rainer proposed to add a foot note at the bottom of the new section 9.6 to allow the end user and the manufacturer to agree on reducing the number of cycles under load if necessary to reduce the amount of test time. There were discussions on IEEE standards to focus on the standard tests, but not necessarily the concern of the duration of the test. Chair commented that he will discuss this request with other experts, but as of Spring-22 meeting, these new sections are considered to be approved by PCS as well and to be released in the upcoming C57.12.90.

6. **New Business** - No additional new business was brought up during the meeting.

7. Next meeting: Fall 2022 Transformer Committee Meeting Scheduled at Charlotte

8. Close of meeting

a. Meeting adjourned at 10:40 AM MST

9. Attendee's list is provided in Annexure - A

Submitted by: Hakan Sahin Date: 4/19/22

**Annexure – A Meeting Attendance:**

Last	First	Last	First	Last	First	Last	First	Last	First
Adams	Keyland	Diaz	Cesar	Jenson	Nicholas	Ramadon	Issack	Winter	Alexander
Alahmed	Alex	Digby	Scott	Josh	Akash	Reto	Fausch	Wright	Jeffrey
Albert	Sanchez	Dillon	Nikalaus	King	Gary	Sahin	Hakan	Zemanov	Kyle
Almedia	Nabi	Doloff	Paul	Kraemer	Axel	Sankarakurup	Dinesh		
Ansari	Tauhid	Door	Jeff	Kraetge	Alexander	Sarkar	Amitabh		
Anton	Koshhel	Elliot	William	Kyle	Stechschuttle	Schwartz	Dan		
Antosz	Steve	Ermakov	Evgenii	Lachman	Mark	Sebastin	Rehoff		
Arnold	Elise	Faherty	Joe	Larrison	Andrew	Selvaraj	Pugal		
Arteaga	Javier	Faur	Florin	Leigl	Angela	Snyder	Steve		
Ayers	Don	Flores	Hugo	Li	Weijun	Som	Sanjib		
Bernesjo	Mats	Frye	Rich	Lucas	Tiffany	Steineman	Andy		
Betancourt	Enrique	Garcia	Eduardo	Mani	Kumar	Sullivan	Liz		
Boettger	William	Girgis	Ramsis	Montpool	Rhea	Taylor	Marc		
Britton	Jeff	Hakim	Shammaun	Morgan	Tyler	Theisen	Eric		
Brown	Darren	Hampton	Steele	Murray	David	Valentin	Reinaldo		
Chakraborty	Arup	Herron	John	Parkinson	Dwight	Vantol	Robert		
Chrysler	Rhett	Hoffman	Saramma	Patel	Nitish	Varghese	Ajith		
Cruzvaldes	Juan Carlos	Hopkinson	Phil	Patel	Sanjay	Varnell	Jason		
Dauzat	Thomas	Hutchinson	Zachary	Poureh	Davoudi	Veerdal	Joshua		
Debass	Samson	Jason	Beaudin	Prince	Jarrold	Watters	Shelby		

### J.9.3 WG PC57.136 Noise Guide

#### **Unapproved Minutes of Fall 2021 TF PCS IEEE PC57.136, “Guide for Audible Sound of Liquid-Immersed Power Transformers”**

The task force met at 1:45 PM, on Monday, March 28, 2022, as part of the TF PCS Guide for Audible Sound of Liquid-immersed Power Transformers. Chairman Steve Antosz presided over the meeting with Dr. Ramsis Girgis being the Vice-Chair, and Mats Bernesjo acted as Secretary.

The meeting was attended by 25 members (out of 46), 35 guests, for a total membership meeting attendance of 60 persons, including 5 requests for membership at this meeting. A quorum was established with  $25 / 46 = 54\%$  attendance. The agenda was unanimously approved as was the unapproved minutes from the previous meeting (Virtual meeting, fall of 2022).

First, the Chairman welcomed the audience to this meeting, reviewed the agenda, and commented on the latest circulated revision of the Guide.

Dr. Girgis then presented new additions to the Guide since last meeting. Some of these were parts in response to previous requests from power Transformer users and some were parts that were yet to be added to the Guide. The sections of the Guide where text was added are as follows:

- Chapter 3: Basic and Standards of Transformer Noise
  - Chapter 3.2.1.5 Impact of load and load power factor
  - 3.2.5 Relative magnitudes of core noise versus load noise

- 3.3.1 IEEE Standards
- Chapter 5: Transformer Noise Reduction in the Design Stage and Factory
  - 5.4.3 External sound panels
  - 5.4.4 Sound enclosures
- Chapter 6: Methods to Mitigate Transformer Noise on Site
  - 6.1 Sound Walls and Sound Barriers
  - 6.2 Other previously used field installed techniques
- Chapter 7
  - 7.2 Determination of appropriate sound level of a transformer on-site

#### Comments from attendees

Stefan Siebert of Brockhaus stated that as the guide is focusing on lowering noise of power transformers, the magnetostriction properties of core steel should be considered. Most recent method of measuring magnetostriction indicates that this measurement can be made with about 5 % uncertainty. Dr. Girgis responded that the Guide discusses core noise in detail including impact of core material. However, he agreed to consider adding a statement or two related to magnetostriction.

Ajith Varghese (SPX Transformer Solutions, Inc.) asked whether external sound mitigation is causing an impact on the cooling capacity of the transformer. Dr. Girgis responded that, in general, cooling from tank surfaces is typically < 10 % of the total cooling of the transformer so reduction of cooling from covered up walls would not be significant. Sanjay Patel (SMIT) indicated that most manufacturers take this into consideration when designing for sound panels, or for retrofit of sound panels. Dan Blaydon (BG&E) also indicated that they do not de-rate a transformer when using external sound mitigation methods. However, he could see that there could be a confusion on how panels could theoretically choke the thermal performance of the transformer. Another question was brought up by John Sen (Duke Energy) whether the Guide would also specify sound panel materials. Dr. Girgis responded that this is the expertise of the sound panels and sound enclosure manufacturers. He agreed that there may be a need to add some text on impact of Sound panels and sound enclosures on cooling. Sanjay Patel (SMIT) promised to provide a photograph of a transformer with sound panels on the tank wall and tank cover (Figure 9 in the draft of the Noise Guide).

Another delegate from Trench commented on that the guide is mostly dealing with sound pressure whereas he would like the guide to also deal with sound power as this is most important to his company. Dr. Girgis replied that sound pressure is what is always measured whereas sound power is calculated and used in theoretical sound modelling of substations. Also, Sound Pressure is what the human ear hears.

Additionally, upon the request by Mr. Onome Avonoma, a comment will be added to the guide on when to perform core noise measurements, before or after dielectrics test.

A solicitation of those in attendance was initiated to request membership in the Noise Guide. A total of five requests were received. The following names and company affiliation are included in this following table.

Alex AlAhmed / Evergy Wolf Creek
Javier Arteaga / Hitachi Energy
Jerzy Kazmierczak / Hitachi Energy
Onome Avonoma / MJ Consulting
Juan Carlos Cruz Valdes / Prolec GE

Finally, the Chairman announced that text to respond to items brought up in this meeting will be added to the present draft of the Guide and Annex – A: Bibliography will be reviewed and updated. The new draft will be emailed to the WG members and guests. A request was made to all attendees to review the new

draft and provide feedback. It is the hope of the chairman that the new Draft, which will be posted on the committee website in the C57.136 section under Performance Characteristics Sub Committee, will be balloted on before the fall 2022 meeting in Charlotte.

With no new business raised, the meeting was unanimously approved to be adjourned.

Respectfully submitted,

Mats Bernesjo, WG Secretary

Spring 2022 WG Meeting Attendance and Affiliation is as follows:

Last name	First name	Company name	Role
Adams	Kayland	SPX Transformer Solutions, Inc	Member
Adetekumbo	Shosanya	XCEL Energy	Guest
AlAhmed	Alex	Evergy Wolf Creek	Guest
Antosz	Stephen	Stephen Antosz & Associates, Inc	Member
Arnold	Elise	SGB	Member
Arteaga	Javier	Hitachi Energy	Guest
Avanoma	Onome	MJ Consulting	Guest
Beaster	Barry	H-J Family of Companies	Guest
Bernesjo	Mats	Hitachi Energy	Member
Blaydon	Daniel	Baltimore Gas & Electric	Guest
Boettger	William	Boettger Transformer Consulting LLC	Member
Brown	Darren	Howard Industries	Guest
Byrnes	Ryan P.	HICO America	Guest
Cruz Valdes	Juan Carlos	Prolec GE	Guest
Digby	Scott	Duke Energy	Member
Dolloff	Paul	East Kentucky Power	Guest
Ebbeny	Alexander	HICO	Guest
Enrique	Betancourt	Prolec GE	Member
Flores	Hugo	Hitachi Energy	Member
Gamboa	Joe	H-J Family of Companies	Guest
Garcia Wild	Eduardo	Siemens Energy	Member
Girgis	Ramsis	Hitachi Energy	Member
Jensen	Nicholas	Delta Star Inc.	Member
Joshi	Akash	Black & Veatch	Member
Kazmierczak	Jerzy	Hitachi Energy	Guest
Kirchenmayer	Egon	Siemens Energy	Guest
Kostel	Anton	Delta Star Inc.	Guest
Lackman	Mark	Doble	Guest
Lawless	Andrew	Potencia Partners	Guest
Mbouombouo	Mama	Hitachi Energy	Guest
Nesvold	Brody	XCEL Energy	Guest
Nims	Joe	Allen & Hoshall	Guest



Pandza	Tihomir	Siemens Energy	Guest
Patel	Nitesh	Hyundai Power Transformers USA	Member
Patel	Sanjay	SMIT Transformer	Member
Plisic	Goran	Siemens Energy	Guest
Pointner	Klaus	Trench Austria GmbH	Member
Pouneh	Davoudi	Delta Star Inc.	Guest
Radbrandt	Ulf	Hitachi Energy	Guest

Riggins	Benjamin	XCEL Energy	Guest
Rocque	Tim	Prolec-GE Waukesha	Guest
Roussell	Marnie	Entergy	Guest
Sankarakarup	Dinesh	Duke Energy	Member
Sarkar	Amitabh	Virginia Transformer	Member
Sauer	Daniel	EATON Corporation	Member
Schappeu	Steven	Prolec-GE Waukesha	Guest
Sen	John	Duke Energy	Member
Sharp	Michael	Trench Ltd. Canada	Guest
Siegbert	Stefan	Brockhaus	Guest
Simons	Andre	JFE Shoji	Member
Sinclair	Jonathan	PPL Electric	Guest
Som	Sanjib	Pennsylvania Transformer	Member
Steineman	Audy	Delta Star Inc.	Guest
Taylor	Marc	JFE Shoji Power Canada Inc.	Member
Thompson	Ryan	Burns & McDonnell	Guest
Varghese	Ajith	SPX Transformer Solutions, Inc	Member
Varnell	Jason	Doble Engineering Co.	Member
Wallach	David	Duke Energy	Member
Wright	Jeffrey	Duquesne Light	Guest
Zibert	Kris	Allgeier Martin	Guest

#### **J.9.4 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 28, 2022  
Denver, Colorado (USA)*

**UNAPPROVED MINUTES**

The PCS Task Force on General Requirements for C57.12.00 met at 3:15 PM on Monday, March 28, 2022. 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 statement from IEEE was 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 33 members (out of 65), 42 guests, for a total meeting attendance of 75 persons, including 6 requests for membership at this meeting. A quorum was established with  $33 / 65 = 51\%$  attendance.

The agenda was unanimously approved (1<sup>st</sup> Dan Sauer, 2<sup>nd</sup> David Wallach) as was the unapproved minutes (1<sup>st</sup> David Wallach, 2<sup>nd</sup> Dan Sauer) from the previous meeting (Virtual meeting, fall of 2021).

The following 6 guests requested membership:

Sanjib Som	Pennsylvania Transformers
Ryan Hogg	Bureau of Reclamation
Nick Jensen	Delta Star Inc.
Alexander Kraetge	Highvolt
Amitabh Sarkar	Virginia Transformers
Dr. Alexander Winter	

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.

#### 1. OLD BUSINESS

##### A. Inclusion of Core information on Nameplate

This request had originally been brought up by Bipin Patel, expecting to simplify GIC evaluation of power transformers (type C Nameplate). In course of discussion with subject matter experts, it turned out that much more information would be required for a proper evaluation. However, a second group of participants saw value on having core type information on nameplate and the topic came back within Group's business agenda.

With support of a TF of WG Members, the Chair developed new proposed text to include on Table 6 of C5.12.00 standard. WG Member Dr. Ramsis Girgis provided detailed description of core type options currently applied in industry. The Chair presented additional material, as a courtesy to the TF, showing simplified drawings (core & coils) of the 8 different core types for Shell and Core form transformers typically used by the Industry and opened the floor for discussion.

A lengthy and informative discussion was held discussing:

- Different core types for Shell form and Core form transformers and its particular configurations, whether to add reference to the simplified drawings presented (Chair's note: not part of the scope of this TF).
- the proposed additions to Rows 25 and 26 and interpretation of # of limbs (wound).
- Other ways of defining # of limbs and wound limbs inside the transformer

Row	Nameplate A	Nameplate B	Nameplate C
25	-	-	Core Design --Shell or Core form

26	-	-	Core Type -Number of limbs (wound), Shell Type - D type , 7 limbs, or others
----	---	---	---

After discussing the above, Dan Sauer motioned to end the debate (seconded by Chris). The motion to end the debate was approved unanimously.

A motion to vote on whether to include the table on the nameplate was proposed (1 opposed). 22 members voted in favor and 1 member opposed the vote. As the motion passed, this nameplate requirement is sent to the PCS.

## B. NEW BUSINESS

### **WG Item 112, Clarification on $\pm 0.5\%$ tolerance of ratio of three phase transformer**

Ryan Musgrove brought up a concern regarding ratio tolerance on 3-phase power transformers. The concern is with a tolerance between phases of a 3-phase transformer. As the standard is written now, there could be a 1% difference between one phase and another. Example, A-phase is -.49 % and C-phase is +.49 percent. Technically both are within 0.5% of nameplate voltage. Mr. Musgrove would like to see additional clarifications for three phase transformers

Again, a lengthy and informative discussion was held discussing:

- What should be the difference in the Standard (Tauhid Ansari) and is the difference specified in the Standard sufficiently accurate? It appears that the specified limit is ok (Ajith Varghese, Dan Blaydon, Dan Sauer) but having the smallest % difference between the phases would be preferred as a slightly higher % difference could indicate a quality problem with the manufacturer. Shamaun Hakim proposed to at least measure the ratio between two phases and to limit the % difference to no more than 0.5 % for two phases.
- Difference due to half-turn in Autotransformers (Sanjay Patel, Ajith Varghese)
- Complexity of a possible repair if % difference is too high
- Consequences and impact of the % difference and at what tap positions should this % difference be maintained

Towards the end of the meeting, due to time constraints, the TF would not be able to settle on an agreeable difference during this meeting and a motion to establish a TF was raised. The question whether a TF would be needed or whether a Study group would be sufficient was raised by Dan Blaydon. Bruce Forsyth indicated that they are the same, but it would be good to have a shorter time frame for this study.

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

No new business was proposed.

Meeting was adjourned at 4:30 PM (Motion **Sanjay Patel**, Second **Sanjib Som**)

Respectfully submitted,  
 Tauhid Ansari  
 WG Chair

Enrique Betancourt  
 Co-Chair

Mats Bernesjo  
 Acting Secretary

Attendance Fall 2022 Spring Meeting – PCS TF on General Requirements C57.12.00

Last name	First name		Last name	First name
Alahmed	Alex		Kraetge	Alexander
Andre	Simons		Lachman	Mark
Ansari	Tauhid		Leigl	Angela
Antosz	Stephen		McCullough	Doug
Arteaga	Javier		Murray	David
Ayers	Donald		Musgrove	Ryan
Beaudoin	Jasou		Nambi	Shankar
Benzler	Olle		Nesvold	Brady
Bernesjo	Mats		Nims	Joe
Betancourt	Enrique		Parkinson	Dwight
Blaydon	Daniel		Patel	Nitesh
Boettger	William		Patel	Sanjay
Britton	Jeffrey		Pepe	Harry
Brown	Darren		Prince	Jarrold
Chakraborty	Arup		Radbrandt	Ulf
Davoudi	Pouneh		Rechkopl	Sebastian
Debass	Samson		Rocque	Tim
Digby	Scott		Roussell	Marnie
Dillon	Nikolaus		Sahin	Hakan
Elliott	William		Sankarakurup	Dinesh
Flores	Hugo		Sarkar	Amitabh
Forsyth	Bruce		Sauer	Daniel
Garcia Wild	Eduardo		Selvarat	Dugal
Girgis	Ramsis		Sen	Cihangir
Gomez Hennig	Eduardo		Snyder	Steven
Gragert	Jeffrey		Som	Sanjib
Hakin	Shamaun		Stretch	Kerwin
Herron	John		Taylor	Marc
Hoffman	Saramma		teNyenhuis	Ed
Hogg	Ryan		vanTol	Robert
Hopkinson	Phil		Varghese	Ajith
Jensen	Nick		Varnell	Jason
Jordan	Steven		von Gemmingen	Richard
Joshi	Akash		Wallach	David
Kazmierczak	Jerzy		Winter	Dr. Alexander
Kiparizoski	Zan		Zemanovic	Kyle

Knapp	Evan		Zibert	Kris
Koshel	Anton			

## **J.9.5 WG HV & EHV Breaker & Transformer Sw. Transients C57.142**

### **MEETING NOTES**

#### **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**

Denver, CO

Tuesday, March 29<sup>th</sup>, 2022

3:15 PM – 4:30 PM Mountain Time Zone - USA

**Chairman – Jim McBride**

**Vice Chair – Xose Lopez-Fernandez**

**Secretary – Tom Melle**

- 1) Meeting called to order at 3:15 PM Central Time.  
Welcome and Chair's Remarks
- 2) 53 Attendees were present (32 Guests) 21 of 49 Members present  
Quorum was not achieved.
- 3) IEEE Patent Policy Slides and Copyrights slides (NO essential patent claims or copyright issues)
- 4) Approval of Agenda and Minutes from Last Meeting.  
Quorum was not achieved. Therefore, the Minutes will be sent by e-mail for approval.
- 5) SA Ballot– Jim McBride

C57.142 Draft 10 is now under ballot. Only the slight editorial changes and mandatory changes requested by MEC were made between Draft 10 and the Draft 9B which was approved by the WG.

#### **6) Switchgear Liaison Update**

No new business from the Switchgear group. The Spring Switchgear Committee meeting will be held in Orlando, FL from April 10<sup>th</sup> – 14<sup>th</sup> 2022. We will encourage voting on the ballot at the meeting.

The WG focus now will be on Mitigation Methods until balloting begins.

#### **7) Mitigation Methods Task Force Update – Jim McBride / Phil Hopkinson**

The membership of task force was shown. Several of the suggested mitigation methods follow:

- Resistor-Capacitor Snubbers
- Increasing Insulation in Key Areas with Additional Test Requirement for Special Terminated Lightning Impulse to Better Test for Field Conditions.
- Using Shielding to increase Series Capacitance and reduce capacitance to ground in order to Improve Impulse Distribution and Reduce Series Resonance
- Introduce Internal Surge Protection to Limit Over-voltages During Resonant Conditions
- Reignition Mitigation with Controlled Switching
- Using Resistance Load During Switching to Provide Damping During the Event
- Online Monitoring to Identify Actual Field Interactions and Identify Real World Conditions at the Transformer Terminals and Within the Transformer.

- 8) Presentation: *Mitigation of internal over-voltages with MOV's* - Juliano Montanha, Egon Kirchenmayer. The presentation will be available on the working group website.

Following the presentation several questions were fielded by Mr. Kirchenmayer and the Chair regarding ZnO varistors in practical use by manufacturers and about preliminary quality checks and testing of MOV's. There is an IEC standard for surge arrester testing used as a reference for MOV test procedures. The chair also discussed the effect of temperature on losses.

- 9) Preview of Presentation: Mitigation of Failure using online monitoring – Jim McBride (to be presented next meeting)

The Chair provided a brief summary about the mitigation methods discussed in previous meetings.

- 10) New Business – During the Fall 2021 (virtual) meeting, Deepak Kumaria suggested the possibility of including the study of transients on instrument transformers in the WG. This topic will be investigated during the next meeting.
- 11) Next Meeting - Fall 2022 – Charlotte, NC USA (TBD) October 16<sup>th</sup> – 20<sup>th</sup>, 2022
- 12) Motion to Adjournment made by the Chair at 4:30 PM with no objection.

#### Meeting Attendance

Role	Last Name	First Name	Company	City	State	Present 3/29/22
Chair	McBride	James	JMX High Voltage	Fayetteville	GA	X
Sec.	Melle	Thomas	HIGHVOLT	Holly Springs	NC	X
Member	Betancourt	Enrique	Prolec GE	Apodaca	Other	X
Member	Boettger	William	Boettger Transformer Consulting LLC	Danville	CA	X
Member	Britton	Jeffrey	Phenix Technologies, Inc.	Accident	MD	X
Member	Dinh	Huan	Hitachi Energy	Lexington	KY	X
Member	Garcia Wild	Eduardo	Siemens Energy	Guanajuato	Other	X
Member	Heiden	Kyle	EATON Corporation	Milwaukee	WI	X
Member	Hopkinson	Philip	HVOLT Inc.	Charlotte	NC	X
Member	Joshi	Akash	Black & Veatch	Cary	NC	X
Member	Kirchenmayer	Egon	Siemens Energy	Nuremberg	Other	X
Member	Li	Weijun	Braintree Electric Light Dept.	Braintree	MA	X
Member	Pepe	Harry	Phenix Technologies, Inc.	Accident	MD	X
Member	Pointner	Klaus	Trench Austria GmbH	Leonding	Other	X
Member	Radbrandt	Ulf	Hitachi Energy	Ludvika	Other	X
Member	Roussell	Marnie	Entergy	New Orleans	LA	X
Member	Sarkar	Amitabh	Virginia Transformer Corp.	Roanoke	VA	X
Member	Sharp	Michael	Trench Limited	Scarborough	ON	X
Member	Sizemore	Thomas	ABB Inc.	Greenville	NC	X

Member	Snyder	Steven	Hitachi Energy	Versailles	KY	X
Member	Spurlock	Mike	Spurlock Engineering Services	Columbus	OH	X
						X
Guest	Ayers	Donald	Ayers Transformer Consulting	Waxhaw	NC	X
Guest	Craven	Michael	Phoenix Engineering Services	Atlanta	GA	X
Guest	Gamboa	Jose	H-J Family of Companies	High Ridge	MO	X
Guest	Harley	John	FirstPower Group LLC	Peninsula	OH	X
Guest	Jordan	Stephen	Tennessee Valley Authority	Chattanooga	TN	X
Guest	Leigl	Angela	EATON Corporation	Waukesha	WI	X
Guest	Parkinson	Dwight	EATON Corporation	Waukesha	WI	X
Guest	Patel	Nitesh	Hyundai Power Transformers USA	Montgomery	AL	X
Guest	Roman	Zoltan	GE Grid Solutions	Charleroi	PA	X
Guest	Sanchez	Albert	Knoxville Utilities Board	Knoxville	TN	X
Guest	teNyenhuis	Ed	Hitachi Energy	Stoney Creek	ON	X
Guest	Varghese	Ajith	SPX Transformer Solutions, Inc.	Hartland	WI	X
Guest	vonGemmingen	Richard	Dominion Energy	Mechanicsville	VA	X
Guest	Zaman	Malia	IEEE	Piscataway	NJ	X
Guest	Ziger	Igor	KONCAR - Instrument Transformers	Zagreb	Other	X
Guest	Rocque	Tim	Prolec GE Waukesha	Waukesha	WI	X
Guest	Posadas	Daniel	Prolec SA de CV	Mty, NL, MX	Other	X
Guest	Oliveira	Jonas	Hitachi Energy	Crystal Springs	MS	X
Guest	Al Ahmed	Alex	Evergy Wolf Creek	Kansas City	MO	X
Guest	Pandza	Tihomir	Siemens Energy	Zagreb	Other	X
Guest	Gaziloda	Dora	KONCAR - Instrument Transformers	Zagreb	Other	X
Guest	Kotuna	John	Dominion Energy	Richmond	VA	X
Guest	Plisic	Goran	Siemens Energy	Zagreb	Other	X
Guest	Dillon	Nikolaus	Dominion Energy	Richmond	VA	X
Guest	Dolloff	Paul	East Kentucky Power	Winchester	KY	X
Guest	Door	Jeffrey	H-J Family of Companies	Hill Ridge	MO	X
Guest	Shosanya	Adetokunbo	XCEL Energy	Amarillo	TX	X
Guest	Avanoma	Onome	MJC	Winnipeg	Canada	X
Guest	Salmon	Tommy	GE Grid Solutions	Chesterfield	VA	X
Guest	Deverick	Jonathan	Dominion Energy	Richmond	VA	X
Guest	Zhery	Rigi	HICO	Memphis	TN	X
Guest	Debass	Samson	EPRI	Charlotte	NC	X

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Asfnoo	Novet	

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Sanjib	Som	ssom@patransformer.com
Kris	Zibert	Kris.zibert@amce.com

## **Annex K Power Transformers Subcommittee**

**March 30, 2022**

**Denver, Colorado USA**

**Meeting Time: 1:30-2:45 p.m. MT**

**Chair: Ryan Musgrove**

**Vice Chair: Alwyn VanderWalt**

**Secretary: Daniel Blaydon**

### **K.1 Meeting Attendance**

The Power Transformers Subcommittee met on Wednesday, March 30 at 1:30 PM MT. The attendance record indicates that 74 out of 136 members of the subcommittee were in attendance; a quorum at the meeting was achieved. A total of 169 individuals attended the meeting; 1 guest requested membership.

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) made a motion to approve the agenda which was seconded by Steve Shull (BBC Electrical Services). 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 2021 minutes. Dan Sauer (Eaton) made a motion to approve the minutes which was seconded by Steve Shull (BBC Electrical Services). The minutes were approved without objection.

### **K.3 Chair's Remarks**

Ryan Musgrove (Oklahoma Gas & Electric) introduced himself as the new Chair of the PTSC, as the term of the previous Chair, Bill Griesacker (Duquesne Light Co.), had expired. The Vice-Chair and Secretary were reintroduced, as their positions remain unchanged.

The Chair introduced (5) new members which were added to the PTSC membership list since the Fall 2021 meeting. These members are listed below:

Cihangir John Sen (Duke Energy)

Balakrishnan Mani (Virginia Transformer)

Albert Sanchez (Knoxville Utilities Board)

Sanjay Patel (Royal SMIT)  
Waldemar Ziomek (PTI Transformers)

The Chair provided the requirements for establishing and maintaining membership.

The Chair provided an overview 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 provided announced that new Working Group leadership training would be made available through IEEE.

#### **K.4 Working Group and Task Force Reports**

##### **K.4.1 Liaison to PC57.93a IEEE Guide for Installation and Maintenance of Liquid-Immersed Power Transformers – S. Reed**

This liaison activity is related to the topic of low temperature cold starts for transformers with natural ester fluid. An overview of the testing this group plans to perform was provided which includes inserting fiber optics into the transformer to evaluate temperatures at different loading conditions. Scott Reed noted that we were informed that the testing has occurred, but no data has been shared yet with IEEE. There is a meeting in the near future where the data is expected to be shared.

The complete meeting minutes can be found in Attachment K.4.1.

##### **K.4.2 Revision of C57.125 Guide for Failure Investigation, Documentation, Analysis and Reporting for Power Transformers and Shunt Reactors – H. Sahin**

This working group met on Monday and achieved a quorum. They reviewed several clauses within the document that can be revised and agreed to create Task Forces to develop proposed revisions. This guide expires on 12/31/2025. They are expecting to take it to ballot on May 2024.

The complete meeting minutes can be found in Attachment K.4.2.

##### **K.4.3 Revision of C57.131 Tap Changers – C. Colopy**

This working group had two meetings this week. They reviewed changes that were made to the draft document. A motion was made to accept this new draft while keeping the following notes

on Section 6.1.15 Protection against access to hazardous parts and Section 7.2.2 Temperature rise for joint revision with IEC 60214-1. This motion was approved. There was also discussion about Table 3 switching impulse test values. Draft 1.1 will be posted on the Power Transformers Subcommittee page for review.

The complete meeting minutes can be found in Attachment K.4.3.

**K.4.4 Revision of C57.143 – Guide for Application of Monitoring Equipment to Liquid-Immersed Transformers and Equipment – M. Spurlock**

This working group met on Monday and did not achieve a quorum. They currently are conducting a straw ballot of the document which was sent out on March 11th to over 300 recipients. Responses are due back by April 11th. They are expecting to go to ballot in the Fall of 2022. The PAR expires in December 2023.

The complete meeting minutes can be found in Attachment K.4.4.

**K.4.5 Revision of C57.150 Guide for the Transportation of Transformers and Reactors Rated 10,000 kVA or Larger – G. Anderson**

The PAR expires for this revision expires in December 2023. Draft 2 of the guide has been sent to working group members. They expect to resolve comments by April and obtain approval from the working group over the summer to request Subcommittee approval to go to SA ballot at the Fall 2022 meeting. The revised document is expected to be published next year.

The complete meeting minutes can be found in Attachment K.4.5.

**K.4.6 Task Force on V/Hz Curve – J. Watson**

This working group met on Tuesday and did not achieve a quorum. They had some additions to Draft Rev. 0 of the document from various task forces and had discussions around additional information that they may want to add to the document, including standardizing V/HZ curves (scaling and conditions). They will be working on document for next month or so. They are still looking for volunteers to join the WG with experience in this area.

The complete update can be found in Attachment K.4.6.

**K.4.7 Development of PC57.170 Condition Assessment Guide – K. Mani**

This working group met on Tuesday but did not achieve a quorum. Presentations were given by various task forces within the working group. They intend to send sections of the guide out for

straw ballot to the working group later this summer and hope to complete the other draft sections by Fall 2022.

The complete meeting minutes can be found in Attachment K.4.7.

#### **K.4.8 Revision of C57.116 GSU Transformers – W. Li**

This working group met on Monday and achieved a quorum. They reviewed the recommended changes made since the last meeting. All changes were accepted. The working group voted to take the document to the PTSC to request approval to move to ballot.

W.Li (Braintree Electric Light Dept) made a motion to submit Draft 3 of PC57.116 dated March 2022 to SA Ballot. Eduardo Garcia (Siemens Energy) seconded the motion.

The complete meeting minutes can be found in Attachment K.4.8.

#### **K.4.9 PAR Study Group for C57.135, Phase Shifting Transformers - E. Schweiger**

This PAR study group has been working on the PAR wording, with the last meeting taking place on March 14th. The proposed PAR was presented to the Subcommittee.

Ewald Schweiger requested a motion from the Subcommittee to “Create a PAR to revise C57.135-2011 as presented. With the intent to meet as a Working Group at the next meeting, if the PAR approved.”

Steve Shull (BBC Electrical Services, Inc.) made the motion as presented. Joe Watson (JD Watson and Associates Inc.) seconded the motion.

The motion was approved with unanimous consent.

They plan to hold their first working group meeting at the Fall 2022 committee meeting.

The complete meeting minutes can be found in Attachment K.4.9.

#### **K.4.10 PAR Study Group for C57.93, Installation and Maintenance Guide: S. Reed**

This PAR Study Group group met on Tuesday. They continued to review the PAR and table of contents of the existing guide. There was discussion about adding more information about maintenance into the guide specifically for LTCs and Bushings. The next objective is to finalize the title scope and purpose.



The complete meeting minutes can be found in Attachment K.4.10.

**K.4.11 PAR Study Group for C57.17, Arc Furnace Transformers: D. Corsi**

This document expires on 12/31/22. Dom Corsi (Chair) has requested individuals with experience using the standard or manufacturers of arc furnace transformers to review the standard and volunteer to assist with revising the document.

**K.4.12 PAR Study Group for IEEE 638 Class 1E Xfmrs for Nuclear Stations - C. Swinderman**

This standard expires on 12/31/2023. Craig Swinderman (Chair) has requested individuals with experience using the standard to volunteer with revising the document.

**K.5 Old Business**

The chair reviewed the following PAR study groups which were approved by the PTSC via email following the Fall 2022 meeting. Volunteers interested in participating in these groups were requested to contact either the PTSC Chair or PAR Study Group Chair(s). All groups plan to meet as a TF or WG at the Fall 2022 meeting.

C57.153 Paralleling Guide (expires 12/31/2025)  
Mark Tostrud (Dynamic Ratings) will be leading this group.

C57.156 Tank Rupture (expires 12/31/2026)  
Peter Zhao (Hydro One) will be leading this group.

C57.157 Contact Functional Life (expires 12/31/2025)  
Adam Sewell (Quality Switch) will be leading this group.

**K.6 New Business**

There was no new business.

**K.7 Adjournment**

The meeting adjourned at 2:22pm MT.

## **K.8 Attachments**

Attachment K.1 – Attendance  
Attachment K.2 – S22 PTSC Agenda  
Attachment K 4.1 - PC57.93a Minutes  
Attachment K 4.2 – C57.125 Minutes  
Attachment K 4.3 – C57.131 Minutes  
Attachment K 4.4 – C57.143 Minutes  
Attachment K 4.5 – C57.150 Minutes  
Attachment K 4.6 – V/HZ Minutes  
Attachment K 4.7 – C57.170 Minutes  
Attachment K 4.8 – C57.116 Minutes  
Attachment K 4.10 – C57.93 Minutes

Attachment K.1

<b>Role</b>	<b>First Name</b>	<b>Last Name</b>	<b>Company</b>
Member	Kayland	Adams	SPX Transformer Solutions, Inc.
Guest	Alex	Alahmed	Evergy Wolf Creek
Guest	Jennie	Aldenlid	Hitachi Energy
Member	Gregory	Anderson	GW Anderson & Associates, Inc.
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Elise	Arnold	SGB
Member	Javier	Arteaga	Hitachi Energy
Member	Onome	Avanoma	MJ Consulting
Member	Donald	Ayers	Ayers Transformer Consulting
Member	Gilles	Bargone	FISO Technologies Inc.
Guest	Cheryl	Basel	WEG Transformers USA Inc.
Guest	Barry	Beaster	H-J Family of Companies
Guest	Jason	Beaudoin	Weidmann Electrical Technology
Guest	Olle	Benzler	Megger
Guest	Jean-Noel	Berube	Rugged Monitoring Inc.
Member	Enrique	Betancourt	Prolec GE
Member	Wallace	Binder	WBBinder Consultant
Secretary	Daniel	Blaydon	Baltimore Gas & Electric
Member	William	Boettger	Boettger Transformer Consulting LLC
Member	Paul	Boman	Hartford Steam Boiler
Guest	Michael	Botti	Hyosung HICO
Guest	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	Jeffrey	Britton	Phenix Technologies, Inc.
Member	David	Calitz	Siemens Energy
Guest	Juan Alfredo	Carrizales	Prolec GE
Member	Juan	Castellanos	Prolec GE
Guest	Arup	Chakraborty	Delta Star Inc.
Member	Stuart	Chambers	Powertech Labs Inc.
Guest	Jonathan	Cheatham	General Electric
Guest	Larry	Christodoulou	Electric Power Systems

Guest	Olivia	Cordova	Bureau of Reclamation
Guest	Michael	Craven	Phoenix Engineering Services
Member	Juan Carlos	Cruz Valdes	Prolec GE
Guest	Gurk	David	Xcel Energy
Member	Eric	Davis	Burns & McDonnell
Guest	Herton	De Oliveira Filho	PSEG
Guest	Samson	Debass	EPRI
Guest	Jonathan	Deverick	Dominion Energy
Guest	Cesar	Diaz	EATON Corporation
Member	Scott	Digby	Duke Energy
Guest	Nikolaus	Dillon	Dominion Energy
Guest	Larry	Dix	Quality Switch, Inc.
Guest	Zachary	Draper	Delta-X Research Inc.
Guest	John	Eastman	
Member	Evgenii	Ermakov	Hitachi Energy
Guest	Marco	Espindola	Hitachi Energy
Guest	Florin	Faur	SPX Transformer Solutions, Inc.
Member	Reto	Fausch	RF Solutions
Member	Hugo	Flores	Hitachi Energy
Member	Bruce	Forsyth	Bruce Forsyth and Associates PLLC
Guest	Jean-Philippe	Gagnon	Qualitrol Company LLC
Guest	Jose	Gamboa	H-J Family of Companies
Member	Eduardo	Garcia Wild	Siemens Energy
Guest	Orlando	Giraldo	H-J Family of Companies
Member	Ramsis	Girgis	Hitachi Energy
Chair	Bill	Griesacker	Duquesne Light Co.
Member	Niklas	Gustavsson	Hitachi Energy
Guest	Shamaun	Hakim	WEG Transformers USA Inc.
Guest	Bridget	Havens-Spillers	Ameren
Member	Kyle	Heiden	EATON Corporation
Member	John	Herron	Raytech USA

Member	Saramma	Hoffman	PPL Electric Utilities
Guest	Ryan	Hogg	Bureau of Reclamation
Guest	Derek	Hollrah	Burns & McDonnell
Member	Philip	Hopkinson	HVOLT Inc.
Guest	Nicholas	Jensen	Delta Star Inc.
Member	Akash	Joshi	Black & Veatch
Member	Kurt	Kaineder	Siemens Energy
Guest	Jerzy	Kazmierczak	Hitachi Energy
Member	Zan	Kiparizoski	Howard Industries
Member	Egon	Kirchenmayer	Siemens Energy
Guest	Evan	Knapp	EATON Corporation
Member	Axel	Kraemer	Maschinenfabrik Reinhausen
Guest	Alexander	Kraetge	OMICRON electronics Deutschland GmbH
Guest	Tiffany	Lucas, P.E.	SPX Transformer Solutions, Inc.
Guest	Jinesh	Malde	M&I Materials Inc.
Member	Kumar	Mani	Duke Energy
Guest	Tom	Matson	Xcel Energy
Guest	Mama	MbouoMboud	Hitachi Energy
Guest	James	McBride	JMX Services, Inc.
Guest	Brian	McBride	Cargill, Inc.
Guest	Anthony	McGrail	Doble Engineering Co.
Member	Thomas	Melle	HIGHVOLT
Guest	Kent	Miller	T&R Electric Supply Co.
Guest	Philip	Miller	Memphis Light, Gas & Water
Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Member	David	Murray	Tennessee Valley Authority
Member	Ryan	Musgrove	Oklahoma Gas & Electric
Guest	Brady	Nesvold	Xcel Energy
Guest	Dwight	Parkinson	EATON Corporation
Member	Sanjay	Patel	Smit Transformer
Member	Poorvi	Patel	Electric Power Research Institute (EPRI)

Member	Nitesh	Patel	Hyundai Power Transformers USA
Guest	Harry	Pepe	Phenix Technologies, Inc.
Guest	Matthew	Pinard	Weidmann Electrical Technology
Guest	Homero	Portillo	Advanced Power Technologies
Guest	Daniel	Posadas	Prolec SA DECV
Guest	Adnan	Rashid	Measurement Canada / ISED
Member	Scott	Reed	MVA
Guest	Sebastian	Rehkopf	Maschinenfabrik Reinhausen
Guest	Benjamin	Riggins	Xcel Energy
Guest	Kevin	Riordan	WEG Transformers USA Inc.
Guest	Diego	Robalino	Megger
Guest	Tim	Rocque	SPX Transformer Solutions, Inc.
Member	Marnie	Roussell	Entergy
Member	Mickel	Saad	Hitachi Energy
Member	Hakan	Sahin	Virginia/Georgia Transformer
Guest	William	Salmon	Dominion Energy
Member	Albert	Sanchez	Knoxville Utilities Board
Member	Dinesh	Sankarakurup	Duke Energy
Guest	Erick	Sato	Siemens Energy
Member	Daniel	Sauer	EATON Corporation
Member	Alan	Sbravati	Cargill, Inc.
Member	Steven	Schappell	SPX Transformer Solutions, Inc.
Guest	Stefan	Schindler	Maschinenfabrik Reinhausen
Guest	Eric	Schleismann	Southern Company Services
Guest	Alfons	Schrammel	Siemens Energy
Member	Dan	Schwartz	Quality Switch, Inc.
Member	Ewald	Schweiger	Siemens Energy
Guest	Pugal	Selvaraj	Virginia Transformer Corp.
Member	Cihangir	Sen	Duke Energy
Guest	Jeremy	Sewell	Quality Switch, Inc.
Guest	Russell	Sewell	Quality Switch, Inc.
Member	Adam	Sewell	Quality Switch, Inc.

Guest	Samuel	Sharpless	Rimkus Consulting Group
Guest	Adetokunho	Shosanga	Xcel Energy
Member	Stephen	Shull	BBC Electrical Services, Inc.
Guest	Andre	Simons	Cogent Power Inc.
Guest	Jonathan	Sinclair	PPL Electric Utilities
Guest	Kenneth	Skinger	Scituate Consulting, Inc.
Guest	Markus	Soeller	Power Diagnostix Consult GmbH
Member	Sanjib	Som	Pennsylvania Transformer
Guest	Mauricio	Soto	Hitachi Energy
Guest	Arthur	Speegle	Entergy Services, Inc.
Member	Mike	Spurlock	Spurlock Engineering Services, LLC
Member	Brad	Staley	Salt River Project
Member	Markus	Stank	Maschinenfabrik Reinhausen
Member	Kyle	Stechschulte	American Electric Power
Guest	Hampton	Steele	Tennessee Valley Authority
Guest	Andrew	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	Ryan	Thompson	Burns & McDonnell
Guest	Timothy	Tillery	Howard Industries
Guest	Eduardo	Tolcachir	TTE
Member	Mark	Tostrud	Dynamic Ratings, Inc.
Guest	Daniel	Tournoux	SPX Transformer Solutions, Inc.
Guest	Olivier	Uhlmann	Reinhausen Canada Inc.
Vice-Chair	Alwyn	Van Der Walt	Electrical Consultants, Inc.
Guest	Robert	Vantol	Commonwealth Associates, Inc.
Member	Ajith	Varghese	SPX Transformer Solutions, Inc.
Guest	Richard	vonGemmingen	Dominion Energy

Member	Pragnesh	Vyas	Sunbelt-Solomon Solutions
Member	David	Wallach	Duke Energy
Guest	Evanne	Wang	DuPont
Guest	Alan	Washburn	Burns & McDonnell
Member	Joe	Watson	JD Watson and Associates Inc.
Member	Bruce	Webb	Knoxville Utilities Board
Member	Daniel	Weyer	Nebraska Public Power District
Member	William	Whitehead	H2scan Corporation
Guest	Trenton	Williams	Advanced Power Technologies
Member	Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden
Member	Jeffrey	Wright	Duquesne Light Co.
Guest	Malia	Zaman	IEEE
Member	Kris	Zibert	Allgeier, Martin and Associates



# AGENDA

## Power Transformers Subcommittee

IEEE PES Transformers Committee

Wednesday, March 30, 2022, 1:30-2:40 PM CST, Centennial E (3)

In Person – Welcome All

**Ryan Musgrove – Chair, Alwyn VanderWalt – Vice Chair, Dan Blaydon – 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/Axel Kraemer
    - i. Monday March 28, 9:30-10:45 - Centennial F
  - b. WG Revision of C57.116, GSU Transformers .....Weijun Li
    - i. Monday March 28, 11:00-12:15 – Centennial G
  - c. WG Revision of C57.143, Monitoring Guide .....Mike Spurlock
    - i. Monday March 28, 3:15-4:30 – Centennial G
  - d. WG Revision of C57.125, Failure Investigating and Reporting .....Hakan Sahin
    - i. Monday March 28, 4:45-6:00 – Centennial G
  - e. WG C57.170, Condition Assessment Guide .....Kumar Mani
    - i. Tuesday March 29, 8:00-9:15 – Centennial G
  - f. WG Revision of C57.150, Transportation Guide .....Greg Anderson
    - i. Tuesday March 29, 9:30-10:45 – Centennial G
  - g. WG for Transformer Volts per Hertz C57.107.....Joe Watson
    - i. Tuesday March 29, 1:45-3:00 – Centennial D-E
  - h. PAR Study Group for C57.93, Installation and Maintenance Guide ...Scott Reed
    - i. Tuesday March 29, 3:15-4:30 – Centennial G

- i. Liaison to PC57.93a – Installation and Maintenance Guide .....Scott Reed
  - j. PAR Study Group for C57.135, Phase Shifting Transformers .....Ewald Schweiger
  - k. PAR Study Group for C57.17, Arc Furnace Transformers .....Dom Corsi
  - l. PAR Study Group for IEEE 638 Class 1E Xfmrs for Nuclear Stations ...Craig Swinderman
- 8. Old business
  - m. Results of PAR Study Group E-mail Poll
    - i. C57.153 Paralleling Guide (expires 12/31/2025)..... Mark Tostrud
    - ii. C57.156 Tank Rupture (expires 12/31/2026)..... Peter Zhao
    - iii. C57.157 Contact Functional Life (expires 12/31/2025)..... Adam Sewell
- 9. New business
- 10. Adjournment

C57.93a Meeting Notes

Spring 2022

Low-temperature cold start test protocol for transformer with natural ester.

The Chinese working group has not met in 9 months. Last summer they developed a procedure to perform a low temperature cold start up on a transformer. The agreed upon procedure consists of the following:

1. Install four fiber optic temperature sensors in the transformer.
2. Gradually cool the transformer down to -40 Celsius.
3. Perform the testing under two scenarios
  - a. Energize with no load, then 25%, 50%, 75% and then 100%.
  - b. Energize the transformer immediately fully loaded.
4. The tests will be completed after the four temperature probes stabilize in temperature.
5. After the load is removed and the test is completed, a DGA will be taken on the fluid after 24 hours to determine if any arcing occurred

We are being told that testing has occurred, but no data has been shared yet. They are expecting to have a meeting this June.

## Power Transformer 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** 10%

**Current Draft Being Worked On:** Draft not started      **Dated:** n/a

**PAR Expiration Date:** December 31, 2025

**Meeting Date:** 28 March 2022      **Time:** 4:45pm MDT

**Location:** Denver, CO, USA

<b>K.9</b>	<b>Attendance:</b>	<b>K.10</b>	<b>Members</b>	<u>27 of 56</u>
	<b>K.11</b>	<b>K.12</b>	<b>Guests</b>	<u>76</u>
	<b>K.13</b>	<b>K.14</b>	<b>Guests Requesting Membership</b>	<u>To be done with email to chair/secretary</u>
	<b>K.15</b>	<b>K.16</b>	<b>Total*</b>	<u>103</u>

\* Attendance list for this meeting is shown at end of meeting minutes

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#### **Meeting Minutes / Significant Issues / Comments:**

Meeting was called to order at 4:45pm MDT, March 28, 2022.

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. Guest list had chair/secretary email addresses listed for requesting membership
- e. Updated membership review and count for quorum
  - i. 56 members were listed and 28 were counted as present by hand count
  - ii. Attendance sheets after meeting completed showing 27 members attended which is official count for quorum.
  - iii. Email votes on motions approved in this meeting will be done since QUORUM WAS NOT MET
  - iv. Members are expected to stay in the meeting so business can be conducted.
- f. Approval of Agenda
  - i. MOTION-W.Binder, 2<sup>nd</sup>-P.Selvaraj. No objection to unanimous approval. Will need email vote follow up since quorum was not met.
- g. Approval of minutes from 2021 Fall WG C57.125 Meeting
  - i. No objection to unanimous approval. Will need email vote follow up since quorum was not met.

## 2. New Business

- a. Reminder on the purpose and the scope of the working group
  - 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
- b. Section 4.2 Investigation flow chart – proposal presented by chair for changing wording of this section by changing “...include insulating liquid sampling for dissolved gas Analysis.” To be: “...include insulating liquid sampling for dissolved gas Analysis, and other oil sampling for other oil quality tests to verify the integrity of the transformer for continuous operation.”
  - i. The group had discussions about this proposal and a motion was made.

- ii. MOTION-T.Ansari, 2<sup>nd</sup>-W.Binder: Review clause 4.2 and recommend changes/additions.
    - 1. No objection to unanimous approval. Will need email vote follow up since quorum was not met.
- c. Section 5.3.6.3 Testing under vacuum – proposal presented by chair asking if a value should be specified for “sufficiently low voltage.”
  - i. The group had discussions about this section and a motion was made
  - ii. MOTION-E.teNyenhuis, 2<sup>nd</sup>-W.Boettger: Remove section 5.3.6.3 Testing under vacuum from guide.
    - 1. YES-13, NO-8, ABSTAIN-4
      - a. Vote did not pass without quorum so email vote will not be sent on this motion
  - iii. MOTION-B.Forsyth, 2<sup>nd</sup>-A.Sarkar: Change wording of section 5.3.6.3 to read “Do not test under vacuum.”
    - 1. Motion was discussed then an amendment was proposed
    - 2. MOTION AMENDMENT-R.vonGemmingen, 2<sup>nd</sup>-B.Forsyth: postpone motion above indefinitely
      - a. No objection to unanimous approval. Will need email vote follow up since quorum was not met.
  - iv. MOTION- R.vonGemmingen, 2<sup>nd</sup>-P.Selvaraj: Review and revise section 5.3.6.3 to understand safety and consequences of testing under vacuum.
    - 1. No objection to unanimous approval. Will need email vote follow up since quorum was not met.
- d. Table 2 – proposal presented by chair asking group if “switches, breakers, fuses...” should be added to the general observations in the Table 2.
  - i. Discussions on this proposal included suggestions on how to undertake the review and revision of Table 2 and other portions of PC57.125 document. The consensus seemed to be a “straw ballot” by members after reviewing the existing Guide, therefore a Draft document of C57.125 will be posted on WG page of the Power Transformer Subcommittee website for all members to review.
    - 1. Comment resolution checklist to be used to track comments/changes/suggestions to document.
- e. Task force volunteers to work on section 5.3.6.3
  - i. R.vonGemmingen, A.Sarkar, Pedro?, Mark?
- f. Task force volunteers to work on section 4.2
  - i. T.Ansari, P.Selvaraj, S.Debass

- g. MOTION-B.Forsyth, 2<sup>nd</sup>-P.Selvaraj: Allow guests requesting membership at today's meeting to receive membership. Note: this is at the Chair's discretion.
  - i. No objection to unanimous approval. Will need email vote follow up since quorum was not met.
  - ii. Chair presented his email at the meeting for guests to send membership requests.
- 3. Next meeting: TBD at Fall 2022 Transformer Committee Meeting scheduled for October 16-20, 2022 in Charlotte, NC, USA.
- 4. Close of meeting
  - a. Meeting adjourned at 6:00pm MDT

Submitted by: Hakan Sahin Date: 4/19/22

**3/28/2022 Meeting Attendance:**

Last Name	First Name	Company (Affiliation)	Role
Adams	Kayland	Prolec GE Waukesha	Guest
Alahmed	Alex	Energy-Wolfcreek	Guest
Alonso	Mario	Georgia Transformer	Guest
Ansari	Tauhid Haque	Hitachi Energy	Member
Arnold	Elise	SGB	Guest
Bargone	Gilles	FISO Technologies Inc.	Guest
Beaudoin	Jason	Weidmann Electrical Technology	Guest
Betancourt	Enrique	Prolec GE	Member
Binder	Wallace	WBBinder Consultant	Member
Boettger	William	Boettger Transformer Consulting LLC	Member
Bradshaw	Jerimiah	Bureau of Reclamation	Guest
Brannen	Randy	Southern Company	Guest
Carrizales	Juan Alfredo	Prolec GE	Guest
Chambers	Stuart	Powertech Labs	Guest
Cordova	Olivia	Bureau of Reclamation	Guest

<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Cruz Valdes	Juan Carlos	Prolec GE	Guest
Debass	Samson	EPRI	Guest
Denzer	Stephanie	Alliant Energy	Guest
Deverick	Jonathan	Dominion Energy	Guest
Dillon	Nikolaus	Dominion Energy	Guest
Dix	Larry	Quality Switch, Inc.	Member
Dolloff	Paul	East Kentucky Power	Guest
Draper	Zachary	Delta-X Research	Guest
Espindola	Marco	Hitachi Energy	Member
Faur	Florin	Prolec GE Waukesha	Guest
Fausch	Reto	RF Solutions	Guest
Flores	Hugo	Hitachi Energy	Guest
Forsyth	Bruce	Bruce Forsyth and Associates PLLC	Member
Gamboa	Jose	The HJ Family of Companies	Guest
Garcia Wild	Eduardo	Siemens Energy	Member
Gazivoda	Dora	Koncar-Instrument Transformers	Guest
Grant	Ben	Delta Star Inc	Guest
Gustavsson	Niklas	Hitachi Energy	Guest
Hoffman	Saramma	PPL	Guest
Hogg	Ryan	Bureau of Reclamation	Guest
Hollrak	Derek	Burns & McDonnell	Guest
Hutchinson	Zachary	East Kentucky Power	Guest
Jensen	Nick	Delta Star Inc	Guest



<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Jordan	Steve	TVA	Guest
Joshi	Akash	Black & Vcatch	Guest
Kazmierczak	Jerzy	Hitachi Energy	Guest
Kiparizoski	Zan	Howard Industries	Guest
Knapp	Evan	EATON Corporation	Guest
Konta	Ivan	Koncar-Instrument Transformers	Guest
Kraemer	Axel	Maschinenfabrik Reinhausen	Member
Kraetge	Alexander	OMICRON electronics Deutschland GmbH	Member
Lawless	Andrew	Potencia Partners	Guest
Leigl	Angela	EATON Corporation	Guest
Lewand	Lance	Doble Engineering Co.	Guest
Li	Weijun	Braintree Electric Light Dept.	Member
Mami	Kumer	Duke Energy	Guest
Mani	Balakrishnan	Virginia Transformer Corp.	Guest
Martinez	Rogelio	Georgia Transformer	Guest
Matson	Thomas	Xcel Energy	Guest
McBride	Jim	JMX High Voltage	Guest
Melle	Tom	Highvolt	ViceChair
Murray	David	TVA	Guest
Musgrove	Ryan	Oklahoma Gas & Electric	Member
Nims	Joe	Allen & Hoshall	Guest
Panesar	Parminder	Virginia Transformer Corp.	Member
Parkinson	Dwight	EATON Corporation	Guest

<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Patel	Nitesh	Hyundai Power	Guest
Patel	Poorvi	EPRI	Guest
Patel	Sanjay	Smit Transformer	Member
Prevost	Thomas	Weidmann Electrical Technology	Guest
Riggins	Benjamin	Xcel Energy	Guest
Robalino	Diego	Megger	Member
Saad	Mickel	Hitachi Energy	Guest
Sahin	Hakan	Virginia/Georgia Transformer	Chair
Sanchez	Albert	Knoxville Utilities Board	Member
Sarkar	Amitabh	Virginia Transformer Corp.	Member
Schappell	Steven	Prolec GE Waukesha	Guest
Schrammel	Alfons	Siemens Energy	Guest
Selvaraj	Pugal	Virginia Transformer Corp.	Member
Sen	Cihangir	Duke Energy	Guest
Sewell	Adam	Quality Switch, Inc.	Secretary
Shull	Stephen	BBC Electrical Services	Guest
Sinclair	Jonathan	PPL Electric	Guest
Sizemore	Thomas	ABB	Guest
Spurlock	Mike	Spurlock Engineering Svcs	Guest
Staley	Brad	SRP	Guest
Stechsulte	Kyle	AEP	Guest
Steele	Hampton	TVA	Guest
Sumner	Deanna	SD Myers	Guest

<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Szczechowski	Janusz	Maschinenfabrik Reinhausen	Member
Tanaka	Troy	Burns & McDonnell	Member
Taylor	Marc	JFE Shoji Power Canada Inc.	Member
teNyenhuis	Ed	Hitachi Energy	Member
Thompson	Ryan	Burns & McDonnell	Guest
Tolcachir	Eduardo	Tobos trans	Guest
Uhlmann	Olivier	Reinhausen Canada	Guest
Vanderwalt	Alwyn	ECI	Guest
Varghese	Ajith	Prolec GE Waukesha	Guest
Varnell	Jason	Doble Engineering Co.	Member
vonGemmingen	Richard	Dominion Energy	Member
Wallace	David	Mississippi State University	Guest
Wallach	David	Duke Energy	Guest
Washburn	Alan	Burns & McDonnell	Member
Weyer	Daniel	NPPD	Guest
Whitten	Christopher	Hitachi Energy	Guest
Winter	Alexander	Highvolt	Guest
Woods	Deanna	Alliant Energy	Guest
Ziger	Igor	Koucar-WJT	Guest

## Power Transformer Subcommittee

### Working Group Report

Document #: C57.131

Document Title: Standard Performance Requirements and Test Methods for Tap-changers

Chair: Craig A. Colopy Vice-Chair: Axel Kraemer

Secretary: Adam M. Sewell Percent Complete: 90%

Current Draft Being Worked On: 1.1 Dated: March 2022

PAR Expiration Date: December 31, 2024

Meeting Date: 28 March 2022 Time: 9:30am-10:45am MDT

Location: Virtual Online Meeting

K.17	Attendance:	K.18	Members	<u>24 out of 44</u>
K.19		K.20	Guests	<u>23</u>
K.21		K.22	Guests Requesting Membership	<u>Send email to secratary</u>
K.23		K.24	Total*	<u>47</u>

\* Attendance list for this meeting is shown at end of meeting minutes

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#### **Meeting Minutes / Significant Issues / Comments:**

5. Meeting was called to order at 9:45am MDT, March 28, 2022.
6. Call for patent disclosure / review of IEEE Copyright Policy

- a. No comments made from attendees
- 7. Quorum Check / Introductions
  - a. Introductions were made by name and affiliation
  - b. 25 members out of 44 were in attendance – QUORUM MET
  - c. Member requests can be sent to ADAMSEWELL@IEEE.ORG
- 8. Approval of Agenda
  - a. Motion – H.Flores 2<sup>nd</sup>-J.Sewell. No opposition to unanimous approval. APPROVED
- 9. Approval of minutes from Fall 2021 Virtual Meeting
  - a. Motion – H.Flores 2<sup>nd</sup>-J.Sewell. No opposition to unanimous approval. APPROVED
- 10. Discussion timeline for this revision
  - a. Current C57.131-2012 expires December 31, 2022
  - b. Par expires December 31, 2024
- 11. Discussion by A. Kraemer from work session held on March 26, 2022
  - a. 14 members attended work session and went through Draft 1.0 to create Draft 1.1
  - b. Changes were shown to working group and MOTION was made
  - c. MOTION-T.Dauzat, 2<sup>nd</sup>-T.Tillery: Accept Draft 1.1 with changes shown in meeting and keep following notes for joint revision with 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
    - ii. Section 7.2.2 Temperature rise - To be considered in a future joint IEC/IEEE revision. Some discussion is warranted regarding the difference between 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. There was no objection to unanimous approval of this motion-APPROVED
  - d. Discussion about Table 3 values for switching impulse test values
    - i. Current IEEE and IEC standards do not list switching impulse values less than 100kV and for joint revision, switching impulse values will be looked at for less than 100kV. 69kV was a value brought up in this meeting.

- e. Draft 1.1 will be posted on the Power Transformers Subcommittee page. Chair requested all members to review all appendices for comments.
12. Next meeting: TBD at Fall 2022 Transformer Committee Meeting scheduled for October 16-20, 2022 in Charlotte, NC, USA.
13. Close of meeting
- a. Meeting adjourned at 10:45am MDT. Motion – J.Sewell, 2<sup>nd</sup> – M.Stank. No opposition to unanimous approval. ADJOURNED.

Submitted by: Craig A. Colopy Date: \_\_\_\_\_

**Meeting Attendance 3/28/202:**

Last Name	First Name	Company (Affiliation)	Role
Adams	Kayland	SPX Transformer Solutions, Inc.	Guest
Aldenlid	Jennie	Hitachi Energy	Member
Beaudoin	Jason	Weidmann	Guest
Benzler	Olle	Megger	Guest
Boettger	William	Boettger Transformer Consulting LLC	Guest
Calitz	David	Siemens Energy	Member
Chakraborty	Arup	Delta Star Inc.	Guest
Cruz Valdes	Juan Carlos	Prolec GE	Member
Dauzat	Thomas	General Electric	Member
Dillon	Nikolaus	Dominion Energy	Guest
Dix	Larry	Quality Switch, Inc.	Member
Eiarza	Hector	Orto de Mexico	Guest
Faur	Florin	Prolec GE Waukesha	Member
Flores	Hugo	Hitachi Energy	Member
Griesacker	Bill	Duquesne Light Co.	Member
Gustavsson	Niklas	Hitachi Energy	Member

<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Halcim	Samauy	WEG USA	Guest
Havens-Spillers	Bridget	Ameren Mo.	Guest
Hutchinson	Zachary	East Kentucky Power Cooperative	Guest
Kraemer	Axel	Maschinenfabrik Reinhausen	Vice-Chair
Kurth	Bernhard	Maschinenfabrik Reinhausen	Guest
Lejay	Olivier	Huaming USA Corp.	Member
Matzon	Tom	Xcel Energy	Guest
McCullough	Douglas	Maxima-Hyundai	Guest
Miller	Philip	MLGVY	Guest
Munoz Molina	Martin	Orto de Mexico	Member
Pollaro	Dominic	NASS	Guest
Posadas	Daniel	Prolec GE	Guest
Posadas	Daniel	Prolec GE	Guest
Pruente	John	SPX Transformer Solutions, Inc.	Member
Schindler	Stefan	Maschinenfabrik Reinhausen	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
Som	Sanjib	Pennsylvania Transformer	Member
Stank	Markus	Maschinenfabrik Reinhausen	Member
Steckschulte	Kyle	American Electric Power	Member
Steineman	Andy	Delta Star Inc.	Guest

<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Szczechowski	Janusz	Maschinenfabrik Reinhausen	Guest
Tanaka	Troy	Burns & McDonnell	Guest
Tillery	Timothy	Howard Industries	Member
Uhlmann	Olivier	Reinhausen Canada	Guest
Washburn	Alan	Burns & McDonnell	Member
Whitehead	William	H2scan Corporation	Member
Whitten	Christopher	Hitachi Energy	Member
Ynui	Andrea	Siemens Energy	Guest
<b>Meeting attendance 3/26/2022:</b>			
<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Aldenlid	Jennie	Hitachi Energy	Member
Dauzat	Thomas	General Electric	Member
Dix	Larry	Quality Switch, Inc.	Member
Faur	Florin	Prolec GE Waukesha	Member
Gustavsson	Niklas	Hitachi Energy	Member
Kraemer	Axel	Maschinenfabrik Reinhausen	Vice-Chair
Lejay	Olivier	Huaming USA Corp.	Member
Rehkopf	Sebastian	Maschinenfabrik Reinhausen	Member
Schwartz	Dan	Quality Switch, Inc.	Member
Sewell	Adam	Quality Switch, Inc.	Secretary
Sewell	Jeremy	Quality Switch, Inc.	Member
Stank	Markus	Maschinenfabrik Reinhausen	Member
Tillery	Timothy	Howard Industries	Member



<b>Last Name</b>	<b>First Name</b>	<b>Company (Affiliation)</b>	<b>Role</b>
Whitten	Christopher	Hitachi Energy	Member

**C57.143 – IEEE Guide for Transformer Monitoring****Monday, March 28, 2022****Denver, CO, USA****Minutes of WG Meeting**

**The meeting was called to order at 3:15 PM by Chair Mike Spurlock. Secretary Elizabeth Bray was not present. Vice-Chair Poorvi Patel was present and filled the role of Secretary for the meeting.**

**A quorum was not reached. There were 51 of 117 members present and 37 guests. Two guests requested membership. The attendance for this meeting was as follows:**

- Number of Members in Activity = 117
- Number of Members Present = 51
- Percentage of Members Present = 43.6%
- Number of attendees = 88
- Attendees requesting Membership = 2

A List of Meeting Attendees is provided below.

Last Name	First Name	Association	
Aldenlid	Jennie	Hitachi	Guest
Almeida	Nabi	Prolec GE	Member
Alonso	Mario	Georgia Transformer	Guest
Avanoma	Onome	CG Power Systems Canada	Guest
Bargone	Gilles	FISO Technologies Inc.	Member
Benach	Jeff	Megger	Guest
Berube	Jean-Noel	Rugged Monitoring Inc.	Member
Boman	Paul	Hartford Steam Boiler	Member
Bradshaw	Jeremiah	Bureau of Reclamation	Member
Calitz	David	Siemens Energy	Member
Castellanos	Juan	Prolec GE	Guest
Chambers	Stuart	Powertech Labs Inc.	Member
Cheatham	Mark	General Electric	Member
Christodoulou	Larry	Electric Power Systems	Member

Cordova	Olivia	Bureau of Reclamation	Guest
Craven	Michael	Phoenix Engineering Services	Guest
Debass	Sam	EPRI	Guest
Denzer	Stephanie	Alliant Energy	Member
Diaz	Cesar	Easton Corporation	Guest
Dollof	Paul	East Kentucky Power	Guest
Draper	Zachary	Delta-X Research Inc.	Guest
Dulac	Hakim	Qualitrol Company LLC	Member
Eastman	John	ZTZ Service International	Guest
Ermakov	Evgenii	Hitachi Energy	Guest
Espindola	Marco	Hitachi Energy	Member
Faur	Florin	SPX Transformer Solutions Inc.	Member
Fazlic	Zlatan	Camlin Power	Member
Frimpong	George	Hitachi Energy	Member
Gara	Lorne	Shermco	Member
Gustavsson	Niklas	Hitachi Energy	Member
Harley	Jack	FirstPower Group LLC	Member
Havens Spillers	Bridget	Ameren	Guest
Heiden	Kyle	EATON Corporation	Member
Hoffman	Gary	Advanced Power Technologies	Member
Hoffman	Saramma	PPL Electric Utilities	Member
Hollrah	Derek	Burns & McDonnell	Member
Hutchinson	Zachary	East Kentucky Power	Guest
Jacob	Nathan	Camilin Energy	Guest
Kraemer	Axel	Maschinenfabrik Reinhausen	Member
Kulasek	Krzysztof	Hitachi Energy	Member
Kurth	Bernhard	Reinhausen	Guest
Lamontagne	Donald	Arizona Public Service Co.	Member
Lewand	Lance	Doble Engineering Company	Guest
Mani	Balakrishnan	Virginia Transformer Corp.	Member
Mani	Kumar	Duke Energy	Member
Matson	Tom	Xcel Energy	Guest
McGrail	Tony	Doble Energy	Member
Morales-Cruz	Emilio	Qualitrol Company LLC	Member
Munoz Molina	Martin	Orto de Mexico	Member

Nunez	Arturo	Mistras Group, Inc.	Member
Panesar	Parminder	Virginia Transformer Corp.	Guest
Patel	Poorvi	EPRI	ViceChair
Pinard	Matt	Weidmann Electrical Technology	Guest
Prevost	Tom	Weidmann Electrical Technology	Member
Pruente	John	SPX Transformer Solutions, Inc.	Member
Reed	Scott	MVA	Member
Reeder	Perry	Prolec GE	Guest
Robalino	Diego	Megger	Guest
Saad	Mickel	Hitachi Energy	Member
Salmon	William	Dominion	Guest
Schrom	Wes	Carolina Dielectric	Guest
Shosanya	Adetokunbo	Xcel Energy	Guest
Sinclair	John	PPL Electric Utilities	Member
Soeller	Markus	Power Diagnostix	Guest
Sohail	Mohammed	Trench Limited	Guest
Soto	Mauricio	Hitachi Energy	Member
Sparling	Brian	Dynamic Ratings	Member
Spurlock	Mike	Spurlock Engineering Services, LLC	Chair
Staley	Brad	Salt River Project	Member
Stank	Markus	Maschinenfabrik Reinhausen	Member
Stechschulte	Kyle	American Electric Power	Member
Steele	Hampton	TVA	Guest
Sumner	Dean	SD Myers, LLC.	Guest
Swan	Phil	RESA Power	Guest
Sweetser	Charles	OMICRON electronics Corp USA	Member
Szczechowski	Janusz	Maschinenfabrik Reinhausen	Member
Tostrud	Mark	Dynamic Ratings, Inc.	Member
Tournoux	Daniel	Prolec GE	Guest
Uhlmann	Olivier	Reinhausen Canada Inc.	Guest
Van Der Walt	Alwyn	Electrical Consultants, Inc.	Guest
Watson	Joe	JD Watson and Associates Inc.	Member
Webb	Matt	SPX Transformer Solutions, Inc.	Member
White	Leon	H2Scan	Guest
Whitehead	William	H2scan Corporation	Member

Williams	Trent	Advanced Power Technologies	Member
Woods	Deanna	Alliant Energy	Member
Wright	Jeffrey	Duquesne Light Co.	Member
Ziger	Igor	Koncar	Guest

## *Agenda*

1. Welcome & Introduction
2. Call for Patent Disclosure
3. Chair Remarks
4. Quorum Check
5. Approval of Agenda
6. Approval of Fall 2021 Virtual Meeting Minutes
7. Status of Straw Ballot and Next Steps
8. New Business

The patent and copyright policies were shown by Chair Mike Spurlock. No new patents claims were brought forward.

Since quorum was not reached, the Fall 2021 Meeting Minutes will be sent out by email ballot.

The Chair reminded everyone that a Straw Ballot and comment spreadsheet were sent out on March 11, and is due back by April 11, 2022. Comments should be populated into the spreadsheet and returned to the Chair.

The Par expires December 2023.

There was no new business.

Jim McBride presented methodology and waveforms for on-line FRA.

The meeting was adjourned at 3:45 pm.

**The WG plans to meet at the Fall 2022 Meeting in Charlotte.**

**PC57.150 – IEEE Guide for Transportation of Transformers and Reactors**

**Tuesday, March 29, 2022; 9:30 am- 10:45 am**

**Hyatt Regency Convention Center, Denver, Colorado; Centennial G Ballroom**

**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 43 people present, 19 members, and 24 guests. Attendance was taken as paper rosters were passed around since no RFID utilized this meeting. Quorum was not reached. A list of meeting attendees is included at the end of these minutes.**

**C57.150 is in draft status "Rev D2" and is almost complete, so new material and new members were not requested.**

**Chairs Remarks**

**The Chair apologized for inactivity over the past 18 months due to the COVID crisis.**

A call for essential patent claims was made. No patent claims were identified.

Minutes of the Spring 2019 Meeting will be submitted by email for a vote of approved.

**Meeting Agenda**

1. Welcome & Call to Order
2. Question, Essential Patent Issues
3. Determination of Quorum (more than 24 of 48 members is necessary to have quorum)
4. Approval of the Minutes
5. Old Business
  - Timeline of Project
6. New Business

Attendees were asked to introduce themselves and indicate their affiliations when making comments or asking questions.

## **Old Business**

### **Project Progress to Date**

The Chair announced an extension of the PAR to December 2023 was granted.

The draft of PC57.150 was sent by email on March 7 to the 48 members of the working group. Only four members responded with comments.

### **Remaining Project Timeline**

The Chair discussed the remaining timeline of the project.

- Request volunteers for the ballot comment resolution team (and contact the officers via email)
- Resolve the 4 current comments by the end of April.
- Resend "almost final" draft to 48 members of the working group for straw ballot approval. This requires 2/3 approval of the votes cast, provided more than 24 of all 48 voting members of the working group respond. Submit the draft to the Power Transformer Subcommittee by the Fall 2022 meeting for ballot approval. Need simple majority vote approval.
- Submit the draft to IEEE-SA for Mandatory Editorial Coordination, MEC review. This process typically takes 4-6 weeks.
- Form Ballot Resolution Group, BRG in myProject.
- By the end of the year, the draft standard prepared by the PC57.150 working group will be submitted from the working group to IEEE-SA for sponsor ballot.

## **New Business**

The Chair reviewed a few sample comments to the draft, which were submitted as a response of the March 7th email and asked for several people to volunteer to help resolve the comments. Four individuals volunteered for the ballot resolution team.

The meeting was adjourned at 10:22 am. The WG plans to meet at the Fall 2022 Meeting in Charlotte, North Carolina.

Greg Anderson  
WG Chair

Ewald Schweiger  
WG Vice Chair

Marnie Roussell  
WG Secretary

**C57.150 WG: List of Meeting Attendees at Spring '22 Meeting, including affiliation and voting member status.**

<u>COUNT</u>	<u>LAST NAME</u>	<u>FIRST NAME</u>	<u>AFFILIATION</u>	<u>STATUS</u>
1	Alonso	Mario	Georgia Transformer	Member
2	Anderson	Gregory	GW Anderson & Associates, Inc.	Chair
3	Basel	Cheryl	WEG Transformers USA Inc.	Guest
4	Binder	Wallace	WBBinder Consultant	Member
5	Byrnes	Ryan	HICO America	Guest
6	Cho	Tony	HICO America	Guest
7	Cordova	Olivia	Bureau of Reclamation	Guest
8	Dolloff	Paul	East Kentucky Power	Member
9	Doutrelepont	Alexander	Siemens Energy	Guest
10	Havens	Bridget	Ameren	Guest
11	Hollrah	Derek	Burns & McDonnell	Guest
12	Kapka	Sergiusz	Hitachi Energy	Guest
13	Kazmierczak	Jerzy	Hitachi Energy	Guest
14	Martinez	Rogelio	Georgia Transformer	Guest
15	Matson	Tom	Xcel Energy	Guest
16	McCullough	Douglas	Maxima / Hyundai	Guest
17	Nambi	Shankar	Bechtel	Member
18	Nims	Joe	Allen & Hoshall, Inc.	Guest
19	Pietraszczyk	Marcin	Hitachi Energy	Guest



<b><u>COUNT</u></b>	<b><u>LAST_NAME</u></b>	<b><u>FIRST_NAME</u></b>	<b><u>AFFILIATION</u></b>	<b><u>STATUS</u></b>
20	Pointner	Klaus	Trench Austria GmbH	Guest
21	Reeder	Perry	GE Grid Solutions	Guest
22	Riggins	Benjamin	Xcel Energy	Guest
23	Riordan	Kevin	WEG Transformers USA Inc.	Guest
24	Roussell	Marnie	Entergy	Secretary
25	Schrammel	Alfons	Siemens Energy	Member
26	Schweiger	Ewald	Siemens Energy	Vice-Chair
27	Sen	Cihangir	Duke Energy	Member
28	Sharp	Michael	Trench Limited	Guest
29	Sharpless	Samuel	Rimkus Consulting Group	Member
30	Shull	Stephen	BBC Electric Services Inc	Guest
31	Simons	Andre	Cogent Power Inc.	Member
32	Skinger	Kenneth	Scituate Consulting, Inc.	Member
33	Tanaka	Troy	Burns & McDonnell	Guest
34	Thompson	Ryan	Burns & McDonnell	Guest
35	Tolcachir	Eduardo	Tubos Trans Electric S.A.	Guest
36	Tournoux	Dan	Prolec-GE Waukesha	Guest
37	Uhlmann	Olivier	Reinhausen Canada Inc.	Member
38	VanderWalt	Alwyn	Electrical Consultants, Inc.	Member
39	Wallach	David	Duke Energy	Member
40	Watson	Joe	JD Watson and Associates Inc.	Member
41	Webb	Bruce	Knoxville Utilities Board	Member
42	Weyer	Daniel	Nebraska Public Power District	Member
43	Zibert	Kris	Allgeier, Martin and Associates	Member

**Meeting Minutes**

**PC57.107 WG**

**Recommended Practice for Developing Design Specific Operational Limits for  
Transformers Connected to Generators or Power Systems Subject to Significant Short-term  
Changes in Voltage and/or Frequency**

**Tuesday, March 29, 2022, 1:45-3:00 PM**

**Joe Watson – Chair, Ramsis Girgis - Vice Chair, Secretary – Drew Welton**

The WG met with 37 attendees including 15 members and 22 guests. We were one member short of a quorum so the previous minutes and agenda were not approved and no motions were made or voted on. The minutes will be submitted to the members for approval by email.

No Patent of Copyright issues were raised.

The work of the three Task Forces was presented and discussed.

- Task Force 1: Drew Welton, Kipp Yule, Bruce Webb and Ryan Hogg
- Task Force 2: Ramsis Girgis
- Task Force 3: Joe Watson, Sanjay Patel, Jagdish Burde

Task Force 1 (Drew Welton, Kipp Yule, Bruce Webb and Ryan Hogg) had prepared Section 4.2 covering the causes of short term overexcitation of power transformers and Section 4.3 covering relay practices.

Task Force 2 (Ramsis Girgis) had prepared Section 4.4 and moved material from Section 4 that was more informational to a new Annex A discussing existing short term overexcitation curves, and Annex B with examples of V/Hz curves for various transformer designs.

Task Force 3: (Joe Watson, Sanjay Patel, Jagdish Burde) prepared Section 6 covering temperature limits for metal parts, which was expanded to include different types of insulation materials. The TF's work was revised to a general temperature limit for transformers or reactors with mineral oil or other fluids of 180°C for designs with cellulose type insulation and 200°C for designs with high temperature types of insulation in the areas affected by overexcitation.

Section 5, which provides the recommended procedure for developing Short Term Overexcitation Criteria for Power Transformers and the development of the V/Hz curve was discussed. The general consensus was that the document needs to further define the conditions or assumptions used to calculate the values in the V/Hz curve such as ambient temperature, loading, and other factors but the conditions were only briefly discussed during the meeting and will be developed by the WG in the future.

The WG also discussed the need to establish the standard range of excitation and time for the standard V/Hz curves recommended format and generally agreed that the time was only necessary for a very short time like 2 minutes. We also discussed the need to clarify that the document covers transformers directly connected to generators.

Ed teNyenhuys offered to work with one of the Task Forces and will work with Ramsis Girgis on Task Force 2.

A clean copy of Draft 2 will be emailed to the WG members and guests and posted on the Transformer Team website.

The following officers, members and guests attended the meeting:

Status	Name	Affiliation
Guest	Adetokunbo Shosanya	Xcel Energy
Guest	Alfons Schrammel	Siemens Energy
Member	Amitabh Sarkar	VA Transformer
Guest	Andrea Ynui	Siemens Energy
Guest	Anton Koshel	Delta-Star
Guest	Axel Kraemer	Reinhausen
Member	Balakrishnan Mani	VA Transformer
Guest	Benjamin Riggins	Xcel Energy
Guest	Bridget Havens-Spillers	Ameren
Member	Bruce Webb	Knoxville Utilities Board
Member	Ed teNyenhuis	Hitachi Powergrids
Member	Eduardo Garcia	Siemens Energy
Member	Eduardo Tolcachir	TTE
Member	Emilio Morales-Cruz	Qualitrol
Guest	Enrique Betancourt	Prolec GE
Guest	Eric Davis	Burns and McDonnell
Guest	Evan Knapp	Eaton Corp.
Guest	Giovanni Hernandez	Virginia Transformer Corp.
Member	Huan Dinh	Hitachi Energy
Guest	Jeff Gragert	XCEL Energy
Chair	Joe Watson	JD Watson and Associates
Guest	John Eastman	ZTZ Services
Member	Juan Carlos Cruz Valdes	Prolec/GE
Member	Kayland Adams	SPX
Member	Mats Bernesjo	Hitachi Powergrids
Member	Nicholas Jensen	Delta-Star
Guest	Nitesh Patel	Hyundai
Guest	Onome Avonoma	MJ Consulting

Co-Chair	Ramsis Girgis	Hitachi Energy
Member	Richard von Gemmingen	Dominion Energy
Guest	Robert vanTol	Com Associates
Member	Ryan Hogg	Bureau of Reclamation
Guest	Ryan Musgrove	OG&E
Guest	Ryan Thompson	Burns and McDonnell
Guest	Samson Debass	EPRI
Member	Sanjay Y. Patel	Royal Smit Transformers
Guest	Shankar Nambi	Bechtel
Guest	Tom Matson	Xcel Energy

The meeting adjourned at 2:55PM.  
Joe Watson

**IEEE PC.57.170 Condition Assessment Guide Working Group Meeting Minutes**

Date and Venue: 08:00-9:30 am, March 29<sup>th</sup>, 2022 @ Denver Colorado

Total Attendees: 100

Members: 44 (out of 140) Guest: 56 Guest Requesting Membership: 15 No answer: 0

Total Members: 100, Members Attended: 44; 31.4% quorum was not achieved.

1. The chair outlined the IEEE Patent disclosure and the IEEE Copyright Policy.
2. A membership quorum was polled, but a quorum was not established.
3. Fall 2021 Meeting Minutes and Spring 2022 Agenda could not be adopted since there was no quorum.
4. Task Force presentations were presented by Emilio for Luiz for TF#1, Saramma Hoffman for TF#2, and Jonathan Sinclair for TF#3. Good progress has been made by these three task forces.
5. Jonathan requested attendees to support the task force by providing any bushing failure mechanism photographs to include in the guide.
6. The Chair opened the floor for comments and questions.
7. Brian Sparling from Dynamic Ratings suggested that CIGRE has a bushing reliability guide that Taskforce 3 could use.
8. The Chair requested help from the attendees on writing the condition monitoring / online monitoring section for TF# 3.
9. Poorvi Patel from TF #3 proposed that they would like to use some sections from the CIGRE guide. Bruce Forsyth suggests getting copyright approval from GIGRE to adapt specific section of their TB-761 guide. Tom Prevost recommended checking with the CIGRE to copy that how much content (in %) we can adapt from their guide.
10. The Chair stated that the plan was to circulate a straw ballot of TF #4 sections within this working group for comments later this summer. We also plan to complete the draft sections for Taskforces 1-2-3 before the Fall 2022 meeting.

List of Attendees:

First Name	Last Name	Company
------------	-----------	---------

Alex	Alahmed	Evergy Wolf creek
Jennie	Aloenlio	Hitachi Energy
Elise	Arnold	SGB
silles	bargove	fiso
Barry	Beaster	H-J Family of Companies
Jeff	Benach	Megger
Jean-Noel	Berube	Rugged Monitoring
Enrique	Betancourt	Prolec GE
William	Boettger	Boettger Transformer Consulting LLC
Paul	Boman	Hartford Steam Boiler
Michael	Botti	Hyosung HICO
Jeremiah	Bradshaw	Bureau of Reclamation
Larry	Christodoulou	Electric Power Systems
Olivia	Cordova	Bureau of Reclamation
Juan		
Carlos	Cruz Valdes	Prolec GE
Dauches	davoulli	Delta Star Inc.
samson	Debass	EPRI
Stephanie	Denzer	Alliant Energy
Zachary	Draper	Delta-X Research Inc.
Hakim	Dulac	Qualitrol Company LLC
John	Eastman	ZTZ Services International
Evgenii	Ermakov	Hitachi Energy
Marco	Espindola	Hitachi Energy
Joe	Faherty	OTC service
Florin	Faur	SPX Transformer Solutions, Inc.
Zlatan	Fazlic	Camlin Power
Bruce	Forsyth	Bruce Forsyth and Associates PLLC
George	Frimpong	Hitachi Energy
Rich	frye	EATON Corporation
Eduardo	Garcia Wild	Siemens Energy
Jeffrey	Gragert	Xcel Energy
Niklas	Gustavsson	Hitachi Energy

shamaun	hakim	weg Transformers USA Inc.
Kyle	Heiden	EATON Corporation
Giovanni	Hernandez	Virginia Transformer Corp.
Gary	Hoffman	Advanced Power Technologies
Saramma	Hoffman	PPL Electric Utilities
Zachary	Hutchinson	East Kentucky Power Cooperative
Natan	Jacob	Camlin Power
Nick	Jensen	Delta Star Inc.
Steve	Jordan	TVA
Akash	Joshi	Black & Veatch
Evan	Knapp	EATON Corporation
Anton	Koshel	Delta Star Inc.
Axel	Kraemer	Maschinenfabrik Reinhausen
Alexander	Kraetge	OMICRON electronics Deutschland GmbH
Donald	Lamontagne	Arizona Public Service Co.
Mark	Laohman	Doble Engineering Co.
Weijun	Li	Braintree Electric Light Dept.
Jinesh	Malde	M&I Materials Inc.
Kumar	Mani	Duke Energy
Tom	Matson	Xcel Energy
Mama	Mbouombouo	Hitachi Energy
Anthony	McGrail	Doble Engineering Co.
Philip	Miller	Memphis Light, Gas & Water
Emilio	Morales-Cruz	Qualitrol Company LLC
David	Murray	Tennessee Valley Authority
Ryan	Musgrove	OG&E Electric Services
Joe	Nims	Allen & Hoshall, Inc.
Arturo	Nunez	Mistras Group, Inc.
Nitesh	Patel	Hyundai Power Transformers USA
Poorvi	Patel	Electric Power Research Institute (EPRI)
Sanjay	Patel	Smit Transformer
Matt	Pinard	Weidmann Electrical Technology
Homero	Portillo	Advanced Power Technologies

Thomas	Prevost	Weidmann Electrical Technology
John	Pruente	SPX Transformer Solutions, Inc.
Scott	Reed	MVA
Perry	Reeder	SPX Transformer Solutions, Inc.
	rehkopl	MR
Kevin	Riordan	WEG Transformers USA Inc.
Tim	Rocque	SPX Transformer Solutions, Inc.
Mickel	Saad	Hitachi Energy
Amitabh	Sarkar	Virginia Transformer Corp.
Alan	Sbravati	Cargill, Inc.
Jonathan	Sinclair	PPL Electric Utilities
Markus	Soller	Power Diagnostix
Mauricio	Soto	Hitachi Energy
Brian	Sparling	Dynamic Ratings, Inc.
Thomas	Spitzer	City Transformer Service Co.
Brad	Staley	Salt River Project
Hampton	Steele	TVA
Dean	Summer	SDMyers, LLC.
Charles	Sweetser	OMICRON electronics Corp USA
Troy	Tanaka	Burns & McDonnell
Ed	teNyenhuis	Hitachi Energy
Mark	Tostarod	Dynamic Ratings, Inc.
Olivier	Uhlmann	Reinhausen Canada Inc.
Alwyn	Van Der Walt	Electrical Consultants, Inc.
Robert	Vantol	Commonwealth Associates, Inc.
Jason	Varnell	Doble Engineering Co.
Pragnesh	Vyas	Sunbelt-Solomon Solutions
Alan	Washburn	Burns & McDonnell
Matthew	Webb	SPX Transformer Solutions, Inc.
Daniel	Weyer	Nebraska Public Power District
William	Whitehead	H2scan Corporation
Chris	Whitten	Hitachi Energy
Trenton	Williams	Advanced Power Technologies



Jeffrey Wright Duquesne Light Co.  
Kris Zibert Allgeier, Martin and Associates  
The meeting was adjourned at 09:15 am.

Kumar Mani  
Chair

James Cross  
Vice Chair

Akash Joshi  
Secretary

Working Group PC57.116  
Guide for Transformers Directly Connected to Generators  
Spring 2022 Meeting  
Monday, March 28, 2022, 11 a.m. – 12:15 p.m.  
Hyatt Regency, Denver, CO  
Meeting Room: Centennial G

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**Chair:** Weijun Li, **Vice Chair:** Jason Varnell, **Secretary:** Bill Griesacker

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1. Introductions, establishment of quorum:

The chair announced that if you did not get an email notice from the WG, and especially if your email changed please notify the WG chair so your email can be updated. The members of the WG were counted. There are 21 members so quorum is 11, there were 11 members present at the meeting therefore quorum was achieved.

Attendance summary from paper rosters circulated during meeting:

Members	11
Guests	81
Total Attendance	92
Guests Requested Membership	2

The chair asked the attendees to speak with the WG officers in person after the meeting if they would like to become a member. Two guests requested membership. Both guests met the attendance requirements and will be granted membership.

2. Agenda review and approval:

There was no objection to unanimous approval of the agenda.

3. Call for patents:

The IEEE patent slide was presented and there were no responses voiced.

4. IEEE SA copyright policy:

The copyright slide was presented and no responses were voiced.

5. Approval of Fall 2021 meeting minutes (if quorum is obtained)

Shankar Nambi made a motion to approve the Fall 2021 meeting minutes. Joe Watson seconded the motion. No objections voiced to unanimous approval of the Fall 2021 meeting minutes.

6. Review of project timeline:

The chair reviewed the project timeline and said that it would be possible to hold a vote today to send the draft document to the subcommittee for balloting.

7. Review of new recommended changes since the Fall 2021 meeting

*a. TF1 – Sections 3, 4, 5, 9, 10 and 11 (Shankar Nambi):*

There were no changes since the last meeting.

*b. TF2 – Section 6 (Toby Johnson / Ryan Hogg):*

Changes in section 6.3.1, requirements for minimum voltage at highest tap; document edits were presented. The changes were made to help clarify the text and an example was added. In section 6.4 changes were made because of the -word “risk”, a sentence was modified and the word “risk” was replaced with an explanation of what the risk is. IEEE does not like the term “risk”.

*c. TF3 – Sections 7 and 8 (Kayland Adams):*

There were no changes since the last meeting.

*d. TF4 – New Annex A – Considerations for specifying GSUs (Joe Watson)*

The chair presented the changes made since the last meeting which consisted of editorial changes.

*e. TF5 – New Annex B – Volts/Hertz (Kipp Yule / Joe Watson)*

The chair presented the changes made since the last meeting which consisted of editorial changes. It was discussed if the typical V/Hz curve should be changed to be some other generic curve. There are concerns that there could be delays to make a new curve and possible copy right conflicts with the existing curve. It was acknowledged that the curve has been used in technical papers, including in an EPRI document. It was discussed that the curve could be redrawn. It was stated that there cannot be one curve that covers all transformer designs. The topic was given back to the V/Hz TF to decide how to address the curve. The curve was presented in a Bill McNutt paper in the 1960s and so the copy right would have expired, it was agreed that the paper could be referenced. It was -proposed to remove the figure and it could be added during the ballot process. Joe Watson made a motion to “strike the V/Hz

curve from the document and replace it with reference to document B2 (the Bill McNutt paper) and add reference B2 in the reference section of the document. It was stated that it might be better to find out if there are any copy right conflicts and hold a vote on the changes once this is figured out. The motion was seconded by Ryan Hogg. 1-in favor, 8 against, 1 abstain. The motion did not pass.

8. Old business: none

9. New business

The following changes were proposed by a reviewer:

Change term auxiliary back to auxiliaries. This was already addressed.

Add MW, MVAR MVA to definitions to document. These are basic abbreviations that do not need to be added to the document.

Proposed to change “correct” selection of UT parameters to “proper” selection of UT parameters. There was no perceived difference in terms or advantage to the change.

Ryan Hogg made a motion to approve all new changes to accept the changes as shown in draft D3. This was seconded by Emilio Morales. 10 approve, no opposed, no abstentions.

Joe Watson made a motion to send draft 3 to ballot. The motion was seconded by Kayland Adams. 8 for, 0 opposed, 0 abstention. The motion carries to move to ballot.

10. Action items / next steps

The V/Hz TF will look into any copy right issues with the V/Hz curve.

11. Next meeting will be held in Charlotte, NC in October 2022.

12. Adjournment

The meeting adjourned at 2:14 p.m.

**Attendance:**

<u>First Name</u>	<u>Last Name</u>	<u>Company Name</u>	<u>Role</u>
Kayland	Adams	SPX Transformer Solutions, Inc.	Member
Alex	AlAhmed	Evergy - Wolf Creek	Guest
Mario	Alonso	Georgia Transformer	Guest
Stephen	Antosz	Stephen Antosz and Associates	Guest

Javier	Arteaga	Hitachi Energy	Guest
Gilles	Bargone	FISO Technologies Inc.	Guest
Barry	Beaster	The H-J Family of Companies	Guest
Jason	Beaudoin	Weidmann Electrical Technology	Guest
Mats	Bernesjo	Hitachi Energy	Guest
Enrique	Betancourt	Prolec GE	Guest
William	Boettger	Boettger Transformer Consulting LLC	Guest
Josh	Bohrn	Siemens Energy	Guest
Jeremiah	Bradshaw	Bureau of Reclamation	Guest
David	Calitz	Siemens Energy	Guest
Arup	Chakraborty	Delta Star Inc.	Guest
Anthony	Coker	M & I Materials	Guest
Olivia	Cordova	Bureau of Reclamation	Guest
Juan Carlos	Cruz Valdes	Prolec GE	Guest
Juan Alfredo	Carrizales	Prolec GE	Guest
Jonathan	Deverick	Dominion Energy	Guest
Marcin	Dietraszoyk (sp?)	Hitachi Energy	Guest
Scott	Digby	Duke Energy	Guest
Nikolaus	Dillon	Dominion Energy	Guest
Pouneh	Divoudi	Delta Star Inc.	Guest
Paul	Dolloff	East Kentucky Power	Guest
Jeffrey	Door	The H-J Family	Guest
Marco	Espindola	Hitachi Energy	Guest
Reto	Fausch	RT Solutions	Guest
Zlatan	Fazlic	Camlin Energy	Guest
Hugo	Flores	Hitachi Energy	Guest
Bruce	Forsyth	Bruce Forsyth and Associates PLLC	Guest
Rich	Frye	EATON Corporation	Guest
Eduardo	Garcia Wild	Siemens Energy	Guest
Bill	Griesacker	Duquesne Light Co.	Secretary
Shamaun	Hakim	WEG Electric Corp.	Guest
Bridget	Havens	Ameren	Guest
Giovanni	Hernandez	Virginia Transformer Corp.	Guest
Saramma	Hoffman	PPL	Guest

Ryan	Hogg	Bureau of Reclamation	Member
Nathan	Jacob	Camlin Energy	Guest
Nicholas	Jensen	Delta Star Inc.	Guest
Steve	Jordan	TVA	Guest
Akash	Joshi	Black & Veatch	Guest
Serg	Kapka	Hitachi Energy	Guest
Jerzy	Kazmierczak	Hitachi Energy	Guest
Zan	Kiparizoski	Howard Industries	Guest
Anton	Koshel	Delta Star Inc.	Guest
John	Kotula	Dominion Energy	Guest
Krzysztof	Kulasek	Hitachi Energy	Guest
Mark	Lachman	Doble Engineering Co.	Guest
Donald	Lamontagne	Arizona Public Service Co.	Guest
Andrew	Lawless	Potencia Partners	Guest
Weijun	Li	Braintree Electric Light Dept.	Chair
Andrew	Lugge	Hitachi Energy	Guest
Kumar	Mani	Duke Energy	Member
Balakrishnan	Mani	Virginia Transformer Corp.	Guest
Roger	Martinez	Georgia Transformer	Guest
Mama	Mbouombouo	Hitachi Energy	Guest
Emilio	Morales-Cruz	Qualitrol Company LLC	Member
David	Murray	TVA	Guest
Ryan	Musgrove	Oklahoma Gas & Electric	Guest
Shankar	Nambi	Bechtel	Member
Joe	Nims	Allen & Hoshall	Guest
Tihomir	Pandza	Siemens Energy	Guest
Parminder	Panesar	Virginia Transformer Corp.	Guest
Sanjay	Patel	Smit Transformer	Guest
Nitesh	Patel	Hyundai Power Transformers USA	Guest
Harry	Pepe	Phoenix Technologies	Guest
Goran	Plisic	Siemens Energy	Guest
Hakan	Sahin	Virginia Transformer	Guest
Dinesh	Sankarakurup	Duke Energy	Member
Amitabh	Sarkar	Virginia Transformer Corp.	Guest

Steven	Schappell	SPX Transformer Solutions, Inc.	Member
Stefan	Schindler	Maschinenfabrik Reinhausen	Guest
Alfons	Schrammel	Siemens Energy	Guest
Ewald	Schweiger	Siemens Energy	Guest
Cihangir	Sen	Duke Energy	Guest
Erick	Sato	Siemens Energy	Guest
Sanjib	Som	Pennsylvania Transformer Technology	Guest
Brad	Staley	Salt River Project	Guest
Hampton	Steele	TVA	Guest
Andrew	Steineman	Delta Star Inc.	Guest
Ed	teNyenhuis	Hitachi Energy	Guest
Ryan	Thompson	Burns & McDonnell	Guest
Eduardo	Tolcachir	Tubos Trans Electric S.A.	Guest
Reza	Torabi Goodarzi	SMIT Transformatoren B.V.	Guest
Mark	Tostrud	Dynamic Ratings, Inc.	Guest
Ajith	Varghese	Prolec GE - SPX	Guest
Jason	Varnell	Doble Engineering Co.	Vice-Chair
Richard	vonGemmingen	Dominion Energy	Guest
David	Wallach	Duke Energy	Guest
Joe	Watson	JD Watson and Associates Inc.	Member
Jeffery	Wright	Duquesne Light Co.	Guest

Task Force for Installation of Power Transformers C57.93

Monday, March 29, 2022

3:15 – 4:30 PM

Hyatt Regency

Denver, CO

Chairman Scott Reed

Vice Chairman Alwyn VanderWalt

Secretary Kyle Stechschulte

The meeting was called to order at 3:15 pm by Chair Scott Reed.

Scott	Reed	Ryan	Musgrove
Alwyn	VanderWalt	Olle	Benzler
Kyle	Stechschulte	Diego	Robalino
Kent	Miller	Jason	Beaudoin
Bruce	Webb	Eric	Theisen
Hampton	Steele	Zachary	Hutchinson
Stefan	Schindles	Jennie	Aldenlid
Olivier	Uhlmann	Niklas	Gustavsson
Mickel	Saad	Dean	Sumner
Doug	McCullough	Troy	Tanaka
John	Eastman	Ewald	Schweiger
Benjamin	Riggins	Kenneth	Skinger
Ryan	Hogg	Tom	Matson
Phil	Swan	Joe	Nims
Adnan	Rashid	Cihangir	Sen
Perry	Reeder	Dinesh	Sankarakurup
Lorne	Gara	Eduero	Tolcacler
Matthew	Webb	Joe	Faherty
Robert	Vantol	John	Sinclair
Pugal	Selvaraj	Alien	Clarke
Tom	Aikens	Kris	Zibert
			Havens-
Daniel	Weyer	Bridget	Spillers
Ryan	Thompson	Jerzy	Kazmierczak



Greg Anderson

David Murray  
Evgenii Ermakov

There were 49 guests in attendance. 24 requested and were granted membership given this was the first meeting of the Task Force. No official agenda was presented or approved.

#### Unofficial Agenda

1. Introductions
2. Opening Remarks
3. IEEE Copyright Policy
4. IEEE Patent Policy
5. Review of Current Document
6. New Document
7. Title
8. Scope
9. Purpose
10. Next Meeting
11. Adjournment

Chairman posted the Patent Claim and Copyright slides. No notifications or comments were received.

The chair reviewed the following areas:

- Presented current document title and scope and went through the table of content clauses.

- The title references maintenance but there is very little discussion of maintenance in the guide.

Question was raised whether to separate maintenance into a new section.

- Under Installation, we reviewed the duplication of clauses 4 and 5 because of how the scope is currently written. It separates transformers into categories as either less than 10 MVA and 69 kV or greater than 10 MVA and greater than 69 kV. The question was raised as to considering redefining these sections into “units delivered oil filled” and “units delivered dry.”

- Is the Task Force interested in adding LTC installation practices and maintenance.

- Is the Task Force interested in recommending a partial fill and circulation under vacuum to heat up the core and coil to remove moisture for new installations?

Comments from the Task Force attendees also suggested investigating:

- Diego Robalino suggested researching developing a Maintenance Strategy.

- Greg Anderson mentioned he would like to see the Transformer Storage section reviewed and improved.

- Comments included adding bushing installation and handling.
- Other comments included adding an on line monitoring section.

It was suggested to focus on title and scope in the next meeting to be able to pursue a PAR.

The meeting was adjourned at 4:24 pm.

## ANNEX L

### Standards Subcommittee

**March 30, 2022 Denver, CO**

Standards Subcommittee		
<b>Chair: Daniel Sauer</b>	<b>Vice-Chair: Marcos Ferreira</b>	<b>Secretary: Ajith Varghese</b>
<b>Standards Coordinator: Steve Shull</b>		
Room: Centennial F-G	Date: Mar 30th, 2022	Time: 4:30 PM to 05:45 pm
Total Members: 69	Present at time of quorum check: 35	Attended per Record: 36
Guests present: 36	Membership requested: 9	Membership accepted: 6

#### L.1 Meeting Attendance

The Standards Subcommittee met on Wednesday; Mar 30th, 2022 at 4:30 PM (CST).

**35** members were in attendance at the beginning of the meeting, which met the quorum requirement. Couple of the guests who were present reported that they believed they are members. Secretary reassured that their concern will be reviewed and status will be updated.

Based on attendance roster and after correction to membership, it was confirmed that **36 of 69** members were present. 36 guests were also present of which **9** guests requested membership of which **6** met attendance requirement and will be granted membership.

#### L.2 Chair's Remarks

The Chair welcomed members and guests to the S22 meeting. Chair briefly highlighted the requirement that while introducing one need to state their affiliation.

The Agenda was moved by Jason Varnell and seconded by Steve Antosz. The motion was carried with unanimous consent. The Minutes for Fall 2021 was moved by Steve Snyder and seconded by Sanjib Som. 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 a during every WG meetings including on-line/Teleconference meeting. If there are any patent claim, it shall be noted but not discussed at the working group meetings

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.

WG on C57.12.00, C57.12.90, C57.12.80, C57.152 and C57.13 provided an update on status of their standards. WG reports are included as part of this report.

Steve Antosz informed that Jason Varnell will be the new Vice-Chair/Secretary for WG C57.12.90. Chair informed that he is looking for new chair for WG C57.12.00 to take over from Steve Snyder, who will be stepping down. Steve will continue to support till new chair will take over

### **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: Steven L. Snyder  
March 30, 2022

The purpose of this WG is to compile all the work being done in various TF/WG/SC's for inclusion in the continuous revision of C57.12.00 in a consistent manner. This WG coordinates efforts with the companion standard C57.12.90 so that they publish together.

Standard C57.12.00 was approved by IEEE SA Standards Board on 11-9-2021 and published January 2022. It will be good for 10 years.

A Project Authorization Request (PAR) for Revision of PC57.12.00 has been submitted to NesCom for consideration at the April 27, 2022 meeting, to allow the continuous revision of this standard.

Respectfully submitted,  
Steven L. Snyder, WG Chair C57.12.00  
March 30, 2022

### **L.3.2 WG Standard Terminal Markings and Connections for Transformers C57.12.70**

WG on C57.12.70 did not meet during Spring 22 TC Meeting.

### **L.3.3 WG Standard Transformer Terminology for Transformers C57.12.80**

#### **L.3.3.1 2022 Mar 28<sup>th</sup> Meeting**

**Document #:** C57.12.80

**Document Title:** Standard Terminology for Distribution and Power Transformers

**Chair:** James Graham

**Vice-Chair**

Open

**Secretary** Richard vonGemmingen)

**Current Draft Being Worked On:** 1.0

**Dated:** NA

**Meeting Date:** 2028-03-28

**Time:** 9:30 AM – 10:45 AM

**Attendance:** **Members**

11

**Guests:**

13

**Total**

24

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#### **Meeting Minutes / Significant Issues / Comments:**

Dan Sauer, Acting Chair opened the meeting at 9:30 a.m. on Monday 28 March, 2022.

1) **Quorum Check**

Quorum was achieved with 11 of 14 members present. 13 non-voting participants also attended. No new members have been added.

2) **Approval of the Agenda**

Jeff Wright moved to approve Agenda, Lee Matthews second and motion was unanimously approved.

3) **Approval of the Fall 2020 minutes**

Sankar Nambi moved to approve the fall 2021 minutes, Lee Matthews seconded, and motion was unanimously approved.

4) **Call for Essential Patents**

A call for essential patents was made. No essential patents or issues were reported.

5) **Copyright policy**

The IEEE copyright policy was displayed and quickly reviewed. No issues were reported.

6) Unfinished Business

a) **Thermally Upgraded Paper definition revision**

Kevin Biggie with Weidmann Electrical Technology presented proposed revisions to Thermally Upgraded Paper definition. Proposed revisions are shown **in red**.

1. When tested in accordance with IEEE C57.100, Annex H, “Standard Test Procedure for Qualification of Thermally Upgraded **Kraft** Paper,” it retains a minimum of 50% of initial tensile strength for a time/temperature combination given by the equation:

Time (h) =  $e^{(15,000/(T+273)-28.082)}$  Where:

T = test temperature in °C,

2. The **unaged unused** paper has a minimum nitrogen content of 1.3 %,
3. The **aged** paper retains a minimum of 50% of initial nitrogen content after performing the IEEE C57.100, Annex H test.

Note 1 - **A-typical** The test time/temperature combination **is-shall be** 476 hours at 165 °C

Note 2 - The criterion to retain 50% tensile strength should be considered only as a qualification criterion to determine if a kraft paper can be considered thermally upgraded. The actual expected life of the paper in equipment is longer than given by the formula. Decades of operating equipment manufactured using the Industry Proven System (IPS) including thermally upgraded kraft paper, cellulose pressboard, Polyvinyl Formal (PVF) coated magnet wire, and mineral oil, has shown that a minimum life expectancy of at least 180 000 hours may be assumed, if the hottest-spot temperature of 110 °C, at rated load as defined in IEEE Std C57.12.00 or IEC 60076-1, is maintained.

Note 3 - Because the thermal upgrading chemicals used today contain nitrogen, which is not present in **kraft cellulose** pulp, the degree of chemical modification is determined by testing for the amount of nitrogen present in the treated paper in accordance with ASTM D-982.

Following the presentation was some short discussion.

Shankar Nambi questioned formula for test and reason for 165 C temperature selection. Kevin responded that testing benchmarks are done against industry proven systems which include three tag temperatures of 165 °C, 170 °C and 180°C, which is where the 165 °C temperature was derived.

Gary Hoffman asked if this detail of definition is in C57.100 Annex H why would this need to be in C57.12.80? Discussion amongst membership concluded this was a special situation with existing precedent.

Shankar Nambi brought up discussion that the New Annex H of C57.100 was in draft revision ballot status.

A motion to accept changes to Thermally Upgraded Paper definition was made by Shankar Nambi and seconded by Jeff Wright. Motion was unanimously approved.

## **b) Stray Gassing Definition**

There was no one to present the topic or speak to the proposed definition. A motion to accept definition as written was made by Kyle Heiden. Jeff Wright seconded the motion. Discussion amongst the members followed.

Weijun Li asked if the Note accompanying the definition will be included with the definition.

Conclusion was Yes

Ryan Musgrove stated that stray gassing usually had a source such as Floating bolts, core through bolts etc., and he did not see the definition of stray gassing had any ties to possible causes such as designs, construction or manufacturing. Further discussion indicated that definition implies that Stray Gassing is normal and does not encourage user to consider any actions.

Richard von Gemmingen added to possible causes with experiences due to improperly cured catalyzed coatings inside the transformer tank as well as a situation where a specific type of stainless steel was determined to have caused stray gassing.

Shankar Nambi suggested that more information on the phenomena should be included in the definition.

Weijun Li suggested that the Note should be removed from the proposed definition.

Jeff Wright added experiences of stray or leaching gasses occurring from residual gasses trapped in previously failed transformers which had been repaired.

A vote was taken on the motion to accept definition as written. Motion passed with 2 yes, 0 no, 9 abstentions. Due to the high number of abstentions a re-vote will be taken after further discussion.

## **7) New Business**

- a. Weijun Li brought up Time Line questions concerning ability to complete revisions and asked when Par expires. Par expires December of 2023.
- b. Several Members who had their status indicated as Guest on the Attendance Roster asked how they can have this corrected. Acting Chair indicated this will have to be resolved by the subcommittee Chair. Question will be forwarded to James Graham, WG chair.
- c. Question was brought up as to how Members can get access to latest copy of the standard draft revision? The standard draft will be posted before the next WG meeting.

## **8) The meeting was adjourned at 10:45 a.m. (MDT)**

Next meeting – April 2022 via Webex, tentative

Submitted by: Dan Sauer, Acting Chair

Date: 03/28/2022

## **Meeting Attendance List**

<b>Role</b>	<b>Last Name</b>	<b>First Name</b>	<b>Affiliation</b>	<b>3/28/2022</b>
Chair	Graham	James	Weidmann Electrical Technology	
Secretary	vonGemmingen	Richard	Dominion Energy	X
Member	Betancourt	Enrique	Prolec GE	
Member	Heiden	Kyle	EATON Corporation	X
Member	Hoffman	Gary	Advanced Power Technologies	X
Member	Li	Weijun	Braintree Electric Light Dept.	X
Member	Mai	Tim-Felix	Siemens Energy	X
Member	Matthews	Lee	Howard Industries	X
Member	Murphy	Jerry	Reedy Creek Energy Services	
Member	Musgrove	Ryan	Oklahoma Gas & Electric	X
Member	Nambi	Shankar	Bechtel	X
Member	Sauer	Daniel	EATON Corporation	X
Member	Wright	Jeffrey	Duquesne Light Co.	X
Member	Zibert	Kris	Allgeier, Martin and Associates	X
Guest	Bernesjo	Mats	Hitachi Energy	X
Guest	Biggie	Kevin	Weidmann Electrical Technology	X
Guest	Brannen	Randy	Southern Company Services	X
Guest	Chorzepa	Jaroslav	ABB Inc.	X
Guest	Downey	Andy	Prolec-Waukesha	X
Guest	Eastman	John	ZTZ Services International	X
Guest	Girgis	Ramsis	Hitachi Energy	X
Guest	Hoffman	Saramma	PPL Electric Utilities	X
Guest	Hogg	Ryan	Bureau of Reclamation	X
Guest	Roussell	Marnie	Entergy	X
Guest	Sot	Msunab	Hitachi Energy	X
Guest	Steele	Hampton	TVA	X
Guest	Webb	Matthew	SPX Transformer Solutions, Inc.	X



### **L3.4 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 2022 Denver; March 30, 2022

#### **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.

Currently there are five 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: Pierre Riffon
4. Dielectric Test – Cont Rev to LowFrequency Tests Clause 10, TF Chair: Bill Griesacker
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, TF Chair: Dinesh Sankarakurup

#### **SUMMARY**

C57.12.90-2021 was approved as a revised standard by the IEEE SA Standards Board on November 9, 2021. It was published on February 4, 2022. The WG Chair took out a new PAR on February 28, 2022, and submitted to NESCOM for consideration at their next meeting on April 27, 2022.

#### **FUTURE REVISIONS AND PENDING WORK**

Any new material provided by the various Task Forces to this WG Chair for inclusion in the next revision, will first be approved by the responsible technical subcommittee (Diel Test, PCS, Dist, IL, etc.) and then presented to the Standards Subcommittee for the “official” vote of approval.

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, and there are no changes to the text.

The existing 7.3.2 Comparison method should be renumbered to be 7.3.3, and there are no changes to the text or the 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.

**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.

**Proposed 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. Load Tap Changer performance test with rated voltage. New subclause 8.7.

**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 H<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>2</sub> 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.

## **d. Load Tap Changer performance test with rated current. New subclause 9.6.**

### **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 H<sub>2</sub>, CH<sub>4</sub>, C<sub>2</sub>H<sub>6</sub>, C<sub>2</sub>H<sub>4</sub> and C<sub>2</sub>H<sub>2</sub> 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. Number of short-circuit tests under subclause 12.3.4.

#### **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.

#### **Proposed 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.

All of these above items have been approved in Hakan's Task Force on Tues Nov 16, 2021. They have been passed up to the Performance Characteristics Subcommittee and await the subcommittee's survey and approval.

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. 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 will be:

#### 10.10.2 Instrumentation

The insulation power factor may be measured by special bridge circuits or by the voltampere-watt method. The 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 accuracy of measurement should be as follows:

- for  $PF < 1\%$  ,  $\pm 2\%$  of reading  $\pm 0.05\%$  absolute
- for  $PF > 1\%$  ,  $\pm 5\%$  of reading  $\pm 0.05\%$  absolute

I AM NOT SURE OF THE EXACT TEXT NOR THE EXACT CHANGES. NEED TO GET IT FROM DIEGO ROBALINO. STEVE Nov 2021

3. Other ?

### **PENDING WORK**

Since this is a continuous revision document, there is ongoing work in the various Task Forces.

1. Possible other revisions from Hakan Sahin's PCS TF for Revision of C57.12.90.
2. Possible changes to Clause 13 sound test from Ramsis' TF. Nothing pending as of Spring 2022
3. Possible changes to Subclause 10.2 or 10.3 from Pierre Riffon's TF regarding switching and lightning impulse tests.
4. Other possible revisions to subclauses 10.5 to 10.10 from Bill Griesacker's TF for revision of low frequency tests. Ongoing work continues.
  - Revision to PD test procedure for Class II
  - Class I transformer PD test revision to the test procedure
  - Clarification of measuring voltage during low frequency tests
  - Venting bushings during PD test,
5. Possible changes to subclauses 10.10 and 10.11 from Diego Robalino's TF regarding insulation power factor and insulation resistance.
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.
  - 11.1.2.2.c and 11.3.2. Defining the top oil rise as the last reading at the end of the stabilization period of the total loss run, not an average.
  - Possible revision to 11.4.1 and 11.4.2, regarding K and L type insulating fluids for temperature rise test corrections.
  - Request for clarification for temp test of 3-winding transformers

Respectfully submitted,  
Stephen Antosz, WG Chair  
March 30, 2022

### **L.3.5 WG Standards Transformer on Revision for C57.152, Guide of Field Tests**

*Standards Subcommittee,  
Standards Subcommittee,  
WG – C57.152 Revision  
IEEE / PES Transformers Committee*

*March 28, 2022, 1:45PM – 3:00PM  
**UNAPPROVED MINUTES***

#### **Welcome**

The secretary and the acting chair due to absence of chair and vice chair, Goran Milojevic, opened the meeting at 1:45PM.

#### **1. Attendance and Attendance for Quorum**

At the time of the meeting there are 48 Members, including Chair, Vice Chair and Secretary. Charles Sweetser as the acting secretary counted 20 members as present at the meeting. 71 members and guests signed into the circulating paper roster.

27 members present of 47 mean requirements for quorum was fulfilled. The list of attendees is shown below:

Name	Affiliation	Status
Milojevic, Goran	DV Power	Secretary
Binder, Wallace	WBBinder Consultant	Member
Denzer, Stephanie	Alliant Energy	Member
Ermakov, Evgenii	Hitachi Energy	Member
Gara, Lorne	Shermco	Member
Gustavsson, Niklas	Hitachi Energy	Member
Harley, John	First Power Group LLC	Member
Heiden, Kyle	EATON Corporation	Member
Herron, John	Raytech USA	Member
Kraemer, Axel	Reinhausen Germany	Member
Lejay, Olivier	Huaming USA Corp.	Member
Murray, David	Tennessee Valley Authority	Member
Musgrove, Ryan	Oklahoma Gas & Electric	Member
Parminder, Panesar	Virginia Transformer Corporation	Member
Reed, Scott	MVA	Member
Robalino, Diego	Megger	Member
Saad, Mickel	Hitachi ABB Power Grids	Member
Servaraj, Pugal	Virginia Transformer Corp.	Member
Sweetser, Charles	OMICRON Electronics Corp USA	Member

Tanaka, Troy	Burns & McDonnell	Member
teNyenhuis, Ed	IEEE	Member
Alahmed, Alex	Evergy	Guest
Aldenlid, Jennie	Hitachi Energy	Guest
Ansari, Tauhid	Hitachi Energy	Guest
Beaudoin, Jason	Weidmann	Guest
Benzler, Olle	Megger	Guest
Bradshaw, Jeremiah	Bureau of Reclamation	Guest
Britton, Jeff	Doble Engineering	Guest
Christodoulou, Larry	EPSII	Guest
Cordova, Olivia	Bureau of Reclamation	Guest
Davis, Eric	Burns & McDonnell	Guest
Debass, Samson	EPRI	Guest
Eastman, John	ZTZ Services	Guest
Espinola, Marco	Hitachi Energy	Guest
Faur, Florin	Prolec GE Waukesha	Guest
Fong, Sanford	Georgia Power	Guest
Hoffman, Gary	Advanced Power Technologies	Guest
Hoffman, Saramma	PPL	Guest
Hutchinson, Zachary	East Kentucky Power Cooperative	Guest
Kurth, Bernard	Reinhausen	Guest
Lamontagne, Donald	Arizona Public Service Co.	Guest
Lawrence, Matthew	NASS USA	Guest
Mani, Kumar	Duke Energy	Guest
Matson, Tom	Xcel Energy	Guest
Matthews, Lee	Howard Industries	Guest
McGrail, Tony	Doble Engineering	Guest
Melle, Thomas	HIGHVOLT	Guest
Pinard, Matt	Weidmann	Guest
Pollaro, Dominic	NASS USA	Guest
Pruente, John	Prolec GE Waukesha	Guest
Ramos, Arturo	Mistras	Guest
Reeder, Perry	GE Grid Solutions	Guest
Rehlkopf, Sebastian	Maschinenfabrik Reinhausen	Guest
Sahin, Hakan	Virginia Transformer Corp.	Guest
Schrom, Wes	Carolina Dielectric Co	Guest
Skinger, Kenneth	Stituat Consulting	Guest
Spitzer, Tommy	City Transformer	Guest
Sumner, Dean	SD Myers	Guest
Swan, Phil	RESA Power	Guest
Tournoux, Dan	Prolec GE Waukesha	Guest
Trifunowski, Risto	Trench Limited	Guest
Uhlmann, Olivier	Reinhausen Canada	Guest
van Tol, Robert	Commonwealth Associates	Guest
Vanderwalt, Alwyn	Electrical Consultants, Inc.	Guest
Washburn, Alan	Burns & McDonnell	Guest



Weyer, Daniel	NPPD	Guest
Whitehead, William	HiScan	Guest
Whitten, Christopher	Hitachi Energy	Guest
Woods, Deanna	Alliant Energy	Guest
Zaman, Malia	IEEE - SA	Guest
Zemanovic, Kyle	EATON	Guest

## 2. Approval of Agenda

Due to a lack of quorum, the agenda could not be approved.

## 3. Approval of Minutes of Meeting from Fall 2021

Due to a lack of quorum, the Minutes of Meeting from Fall 2021 could not be approved.

## 4. Call for Patents

The acting 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 acting chair presented IEEE-SA Copyright Policy slides 1-2 informing the audience of the policy.

## 6. Chair's Remarks

In the absence of the chair, Marcos Ferreira, his previously prepared remarks were read by the acting chair.

“On the behalf of Chair welcome all members of this working group to take this opportunity during this Spring meeting to finalize three task forces and two annexes by votes, so we can meet the deadline of the PAR without a need for extension.”

## 7. Task Forces Working Progress Report

### TF-1: Section 7.2 – Main Tank Volunteers

Charles Sweetser (team leader)

The task force has attempted to put the proposed changes to an approval to the rest of the WG multiple times, but the approval was not obtained due to lack of response. The task force continued with its work, and the final version of the material will be provided to the WG by email together with the material from the other work groups.

### TF2: Section 7.3 – Bushings Volunteers

Mario Locarno (team leader)

Due to absence of Mario Locarno, the team leader, the acting chair briefly reported that the work of his task force is finished and ready to be presented to the rest of the WG.

### TF3: Section 7.4 – Tap Changers Volunteers

Marcos Ferreira (team leader)

Due to absence of Marcos Ferreira, the team leader, the acting chair briefly reported that the work of his task force is finished and ready to be presented to the rest of the WG.

**TF4: New Annexes: Dynamic Resistance and Vibroacoustic Measurements**

Goran Milojevic

The task force leader reported that the draft versions of the two new annexes are completed and ready to be presented to the rest of the WG.

**8. Discussion**

With the upcoming expiration of the WG PAR in the Fall of 2023, the acting chair has initiated discussion of the plan of finalizing of the WG work. Due to continued lack of centralized mass mailing system, all future materials and motions will be sent to members by direct email by the WG officers. Present members were encouraged to provide their most recent email address in the roster. The officers will revise the membership roster based on the attendance information.

All task force leaders who have not already done so will provide the final versions of their materials to the WG officers by April 15<sup>th</sup>. All materials will be sent by email to the WG members by the end of April.

The procedure of finalizing the work and putting it to a vote was discussed.

**9. New Business**

No new business was introduced at this time.

**10. Meeting Adjournment**

Due to a lack of quorum, the meeting was ended without a motion to adjourn. The meeting ended at 2:15PM

Respectfully submitted,

Marcos Ferreira – Chair Peter Werelius – Vice 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 Mountain Time, March 29, 2022 (Denver, CO)

## *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. This was the fourth meeting of this Working Group, the first in a face-to-face format. Meeting attendance numbers as follows:

Total Attendance	61
Members in Attendance	24 (out of 67 members, <b>quorum not achieved</b> )
Guests in Attendance	37
Guests Requesting Membership	8

Guests Requesting Membership (attendance at 2 out of 3 meetings required to qualify for membership):

	Membership Granted? (effective after this meeting)
Arup Chakraborty	N
Samson (Sami) Debass	N
Rogelio Martinez	Y
Matthew Pinard	Y
Homero Portillo	N
Amitabh Sarkar	N
Sanjib Som	Y
Alan Washburn	Y

Participants were advised that membership requests could be made via email requests from attendees to the WG Chair or by indicating on the rosters being circulated during the meeting.

The requisite patent and IEEE-SA copyright policy slides were reviewed, with no items noted. The agenda was reviewed by the Chair, with no changes requested by attendees. The minutes from the Fall-2021 meeting had been circulated along with the proposed agenda prior to the meeting. There were no changes to the Fall-2021 meeting minutes requested but a motion to approve could not be entertained since quorum had not been achieved.

The Chair reviewed the project milestones and status, noting the PAR expiration date of December-2024 and the published document's expiration date of December-2025. Draft Rev2 of the Guide had been posted on the website and had been distributed to the WG participants, which had incorporated all revisions and comments thus far with edits indicated by red text.

There was a discussion of the work plan, which is to have the document ready for a straw ballot after the Fall-2022 WG meeting, resolving any further comments received between now and that time prior to that meeting. The question was posed as to whether this straw ballot should include the Standards SC members, but during discussion it was pointed out that the WG is considered the technical body so would probably be most appropriate to constrain a straw ballot to the WG participants. The objective was stated as being to submit for SA ballot no later than the end of December-2023. It was noted that with the PAR expiring in December-2024 and the current published document expiring in December-2025, that the WG is proceeding on a timeline that completes its work ahead of those expiration dates.

The Vice-Chair provided a review of the latest updates to the Guide and the work to resolve comments that had taken place since the prior WG meeting. This included results of discussions held with a commenter related to the Effective Current ( $I_{\text{effective}}$ ) and the resultant text revisions. From discussion it was suggested and agreed to add a bracket after  $IN/3$  within the equation for  $I_{\text{effective}}$  to make the order of mathematical operations clearer. Also reviewed was text added to enhance the section concerning magnetizing current.

The disposition of comments related to section 10 (monitoring) had been unresolved prior to the meeting, but during the meeting Gary Hoffman shared proposed text to resolve a reviewer comment associated with the need to demagnetize Hall Effect CTs if manual and electronic zeroing is not provided. This text was to be forwarded to the WG officers after the meeting for

incorporation into the next Draft. At the conclusion of the discussion, it was noted that no further updates to section 10 were necessary at this time.

The WG Chair noted that since additional references had been added some renumbering of references had taken place. The citation of references throughout the document needs to be reviewed to confirm correlation with the renumbering in the reference section.

The WG Chair will follow up with a reminder email to the WG participants to review the latest Draft of the document and provide any further comments, such that they could be reviewed and resolved to support having a cleaned-up document in advance of the Fall-2022 WG meeting. The WG Chair also made a call for users to review the specification section of the document and comment as necessary.

There were no Old Business items to address and there were no New Business items raised.

The next planned meeting of the WG will be during the Fall-2022 Transformers Committee meetings, scheduled to be held in Charlotte, NC.

The meeting adjourned shortly 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
<b>Chair</b>	Daniel	Blaydon	Baltimore Gas & Electric
<b>Vice-Chair</b>	Ramsis	Girgis	Hitachi ABB Power Grids
<b>Secretary</b>	Scott	Digby	Duke Energy
<b>Member</b>	Jeff	Benach	Megger
<b>Member</b>	Mats	Bernesjo	Hitachi Energy
<b>Member</b>	Hakim	Dulac	Qualitrol Company LLC
<b>Member</b>	Bill	Griesacker	Duquesne Light Co.
<b>Member</b>	Gary	Hoffman	Advanced Power Technologies
<b>Member</b>	Saramma	Hoffman	PPL Electric Utilities
<b>Member</b>	Zan	Kiparizoski	Howard Industries
<b>Member</b>	Balakrishnan	Mani	Virginia Transformer Corp.
<b>Member</b>	Kumar	Mani	Duke Energy
<b>Member</b>	Martin	Munoz Molina	Orto de Mexico
<b>Member</b>	Nitesh	Patel	Hyundai Power Transformers USA
<b>Member</b>	Sanjay	Patel	Smit Transformer
<b>Member</b>	Afshin	Rezaei-Zare	York University
<b>Member</b>	Steven	Schappell	SPX Transformer Solutions, Inc.
<b>Member</b>	Markus	Schiessl	SGB
<b>Member</b>	Marc	Taylor	JFE Shoji Power Canada Inc.
<b>Member</b>	Mark	Tostrud	Dynamic Ratings, Inc.
<b>Member</b>	Jason	Varnell	Doble Engineering Co.
<b>Member</b>	David	Wallach	Duke Energy
<b>Member</b>	Joe	Watson	JD Watson and Associates Inc.
<b>Member</b>	Trenton	Williams	Advanced Power Technologies
<b>Guest</b>	Kayland	Adams	SPX Transformer Solutions, Inc.
<b>Guest</b>	Alex	Alahmed	Energy - Wolf Creek
<b>Guest</b>	Stephen	Antosz	Stephen Antosz & Associates, Inc
<b>Guest</b>	Elise	Arnold	SGB
<b>Guest</b>	Gilles	Bargone	FISO Technologies Inc.
<b>Guest</b>	Michael	Botti	HICO America
<b>Guest</b>	Juan Alf..	Carrizabi	Prolec GE
<b>Guest</b>	Arup	Chakraborty	Delta Star Inc.
<b>Guest</b>	Olivia	Cordova	Bureau of Reclamation
<b>Guest</b>	Samson (Sami)	Debass	EPRI
<b>Guest</b>	Marco	Espindola	Hitachi Energy
<b>Guest</b>	Eduardo	Garcia Wild	Siemens Energy
<b>Guest</b>	Hector	Garza	Orto deMexico
<b>Guest</b>	Jeffrey	Gragert	Xcel Energy
<b>Guest</b>	Shamaun	Hakim	WEG Transformers USA Inc.
<b>Guest</b>	Nicholas	Jensen	Delta Star Inc.
<b>Guest</b>	Anton	Koshel	Delta Star Inc.
<b>Guest</b>	Axel	Kraemer	Maschinenfabrik Reinhausen
<b>Guest</b>	Mark	Lachman	Doble Engineering Co.

<b>Guest</b>	Gustavo	Leal	Dominion Energy
<b>Guest</b>	Aleksandr	Levin	Weidmann Electrical Technology
<b>Guest</b>	Rogelio	Martinez	Georgia Transformer
<b>Guest</b>	Lee	Matthews	Howard Industries
<b>Guest</b>	Tony	McGrail	Doble Engineering Co.
<b>Guest</b>	Brady	Nesvold	Xcel Energy
<b>Guest</b>	Matthew	Pinard	Weidmann Electrical Technology
<b>Guest</b>	Homero	Portillo	Advanced Power Technologies
<b>Guest</b>	Sebastian	Renkopf	MR
<b>Guest</b>	Amitabh	Sarkar	Virginia Transformer
<b>Guest</b>	Dan	Sauer	EATON Corporation
<b>Guest</b>	Alfons	Schrammel	Siemens Energie
<b>Guest</b>	Andre	Simons	JFE Shoji
<b>Guest</b>	Sanjib	Som	Pennsylvania Transformer
<b>Guest</b>	Brad	Staley	Salt River Project
<b>Guest</b>	Andy	Steineman	Delta Star Inc.
<b>Guest</b>	Alan	Washburn	Burns & McDonnell
<b>Guest</b>	Jeffrey	Wright	Duquesne Light Co.

### **L.3.7 IEEE / IEC Continuous Cross Reference**

TF did not meet during Spring 22 Transformer Committee.

#### **L.4 Old Business**

There was no old business to discuss.

#### **L.5 New Business**

No new business was brought up for discussion.

#### **L.6 Adjournment**

The meeting was adjourned at 4:53 PM CST.

Respectfully submitted,  
*Ajith M. Varghese*  
Standards SC Secretary

## Standards SC S22 Attendance List

Role	First Name	Last Name	Company	S22
Chair	Daniel	Sauer	EATON Corporation	X
Secretary	Ajith	Varghese	Prolec GE Waukesha	X
Member	Andrew	Larison	Hitachi ABB Power Grids	X
Member	Bill	Griesacker	Duquesne Light Co.	X
Member	Brad	Staley	Salt River Project	X
Member	Bruce	Forsyth	Bruce Forsyth and Associates PLLC	X
Member	Cihangir	Sen	Duke Energy	X
Member	Daniel	Blaydon	Baltimore Gas & Electric	X
Member	Ed	teNyenhuis	Hitachi ABB Power Grids	X
Member	Eduardo	Garcia Wild	Siemens Energy	X
Member	Evgenii	Ermakov	Hitachi ABB Power Grids	X
Member	Florin	Faur	SPX Transformer Solutions, Inc.	X
Member	Gary	Hoffman	Advanced Power Technologies	X
Member	Gilles	Bargone	FISO Technologies Inc.	X
Member	Jarrold	Prince	ERMCO	X
Member	Jason	Varnell	Doble Engineering Co.	X
Member	John	Herron	Raytech USA	X
Member	Jonathan	Sinclair	PPL Electric Utilities	X
Member	Joseph	Tedesco	Hitachi ABB Power Grids	X
Member	Juan Carlos	Cruz Valdes	Prolec GE	X
Member	Kris	Zibert	Allgeier, Martin and Associates	X
Member	Kurt	Kaineder	Siemens Energy	X
Member	Larry	Christodoulou	Electric Power Systems, Inc.	X
Member	Ramadan	Issack	American Electric Power	X
Member	Robert	Ballard	DuPont	X
Member	Sanjib	Som	Pennsylvania Transformer	X
Member	Scott	Digby	Duke Energy	X
Member	Scott	Reed	MVA	X
Member	Sergio	Hernandez Cano	Hammond Power Solutions	X
Member	Shankar	Nambi	Bechtel	X
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc	X
Member	Stephen	Shull	BBC Electrical Services, Inc.	X
Member	Steven	Snyder	Hitachi ABB Power Grids	X
Member	Tauhid Haque	Ansari	Hitachi ABB Power Grids	X
Member	Thomas	Dauzat	General Electric	X
Member	WeiJun	Li	Braintree Electric Light Dept.	X

Role	First Name	Last Name	Company	S22
Guest	Alwyn	Van Der Walt	Electrical Consultants, Inc.	X
Guest	Aniruddha	Narawane	Power Distribution, Inc. (PDI)	X
Guest	Cesar	Diaz	EATON Corporation	X
Guest	Daniel	Posadas	Prolec SA	X
Guest	David	Wallach	Duke Energy	X
Guest	Dwight	Parkinson	EATON Corporation	X
Guest	Eduardo	Gomez-Hennig	Siemens Energy	X
Guest	Egon	Kirchenmayer	Siemens Energy	X
Guest	Ewald	Schweiger	Siemens Energy	X
Guest	Goran	Miloevic	DV Power	X
Guest	Huan	Dinh	Hitachi ABB Power Grids	X
Guest	Javier	Arteaga	Hitachi ABB Power Grids	X
Guest	Jeffrey	Wright	Duquesne Light Co.	X
Guest	Jeremiah	Bradshaw	Bureau of Reclamation	X
Guest	Jerzy	Kazmierczak	Hitachi Energy	X
Guest	Josh	Bohrn	Pacific Corp	X
Guest	Joshua	Verdell	ERMCO	X
Guest	Krzysztof	Kulasek	Hitachi ABB Power Grids	X
Guest	Kumar	Mani	Duke Energy	X
Guest	Marnie	Roussell	Entergy	X
Guest	Nabi	Almeida	Prolec GE	X
Guest	Nick	Jensen	Delta Star Inc.	X
Guest	Nikolaus	Dillon	Dominion Energy	X
Guest	Olivia	Cordova	Bureau of Reclamation	X
Guest	Onome	Avanoma	MJ Consulting	X
Guest	Orlando	Giraldo	H-J Family of Companies	X
Guest	Poorvi	Patel	Electric Power Research Institute (EPRI)	X
Guest	Pragnesh	Vyas	Sunbelt-Solomon Solutions	X
Guest	Reto	Fausch	RF Solutions	X
Guest	Rhett	Chrysler	ERMCO	X
Guest	Richard	vonGemmingen	Dominion Energy	X
Guest	Ryan	Musgrove	Oklahoma Gas & Electric	X
Guest	Ryan	Hogg	Bureau of Reclamation	X
Guest	Samuel	Sharpless	Rimkus Consulting Group	X
Guest	Saramma	Hoffman	PPL Electric Utilities	X
Guest	William	Boettger	Boettger Transformer Consulting LLC	X



# ANNEX M

## Subsurface Transformers and Network Protectors Subcommittee Task force / Working Group Report

**Chairman:** George Payerle

**Vice-Chair:** Tony Reiss

**Meeting Date:** 3/30/2022      **Location:** Denver, CO      **Time:** 11:00 – 12:15 MST

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### Members Present

David	Blew	Retired (PSE&G)
Thomas	Dauzat	General Electric
Larry	Dix	Quality Switch, Inc.
William	Elliott	Prolec GE
Kenneth	Hampton	Baltimore Gas & Electric
Gary	Hoffman	Advanced Power Technologies
Brian	Klaponski	Carte International Inc.
Daniel	Mulkey	Mulkey Engineering Inc.
George	Payerle	Carte International Inc.
Dan	Schwartz	Quality Switch, Inc.
Jeremy	Sewell	Quality Switch, Inc.
Adam	Sewell	Quality Switch, Inc.
Avijit	Shingari	Pepco Holdings Inc.
Alan	Traut	Howard Industries
John	Vartanian	National Grid
Joshua	Verdell	ERMCO
Michael	Zarnowski	Carte International

### Guests Present

* Josh	Adams	Quanta Services
* Nabi	Almeida	Prolec GE
Kevin	Biggie	Weidmann Electrical Tech.
John	Chisholm	IFD Corporation
Herton	de Oliveirafilho	PSE&G
Sanford	Fong	Georgia Power Co.
* Ramadan	Issack	American Electric Power
Andrew	Larison	Hitachi Energy
Angela	Leigl	Eaton
* Vinay	Patel	Consolidated Edison Co. of NY
Daniel	Posada	Prolec
Albert	Sanchez	Knoxville Utilities Board
Stefan	Schindler	Maschinenfabrik Reinhausen

**Subsurface Transformers and Network Protectors Subcommittee  
Working Group Report**

Russell	Sewell	Quality Switch, Inc.
Audrey	Siebert-Timmer	IFD Corporation
* James	Spaulding	Fort Collins Utilities
* Liz	Sullivan	Dominion Energy
Timothy	Tillery	Howard Industries
Bruce	Webb	Knoxville Utilities Board
* William	Whitehead	H2scan Corporation

**Meeting Administration:**

- Call to order at 11:02 MST with 17 members and 20 guests. Seven guests requested membership. As of S22, Mike Zarnowski is now a member.
- Sign In – 2 roster sheets started for circulation
- Chairman's Comments
  - If you have had a change of affiliation or with your e-mail, please advise Chairman or Vice-Chair
  - Introductions done with return to in person meeting
- Quorum Determination, member list
  - Current members 29, 15 needed for quorum. 16 in attendance - quorum was achieved
- Present agenda and approval
  - Minor editorial change (Spring 2021 minutes should be Fall 2021)
  - No objections from the SC for the change. Unanimous approval.
- Approval of the Fall 2021 minutes
  - Motion to approve – Jeremy Sewell, 2<sup>nd</sup> Tom Dauzat.
  - Unanimous approval
- Announce new members
  - none announced
- Does anyone request SC membership? Indicate on roster.

**Working Groups Report:**

- **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: On break

**Subsurface Transformers and Network Protectors Subcommittee  
Working Group Report**

- **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**

Stage: Recently Approved

IEEE/PES Transformers Committee Working Group on Requirements  
For Three-Phase Submersible Transformers (C57.12.24)  
**Meeting Minutes**  
Hyatt Regency, Denver, CO  
Monday, March 28, 2022

Members Present

David	Blew	Retired (PSE&G)
Douglas	Craig	Richards Manufacturing Co.
Thomas	Dauzat	General Electric
William	Elliott	Prolec GE
Ben	Garcia	SCE (virtual)
Kenneth	Hampton	Baltimore Gas & Electric
John	Harley	FirstPower Group LLC
Ramadan	Issack	American Electric Power
Brad	Kittrell	Consolidated Edison Co. of NY
Brian	Klaponksi	Carte International Inc.
Andrew	Larison	Hitachi Energy
Kent	Miller	T&R Electric Supply Co.
Michael	Morgan	Duke Energy
Daniel	Mulkey	Mulkey Engineering Inc.
George	Payerle	Carte International Inc.
James	Ratty	Electronic Technology Inc.
Avijit	Shingari	Pepco Holdings Inc.
Audrey	Siebert-Timmer	IFD Corporation
James	Spaulding	Fort Collins Utilities
Alan	Traut	Howard Industries
Reinaldo	Valentin	Duke Energy
John	Vartanian	National Grid

Guests Present

Alex	Alahmed	Evergy Wolf Creek
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## Subsurface Transformers and Network Protectors Subcommittee Working Group Report

*Nabi	Almeida	Prolec GE
Jeff	Benach	Megger
Kevin	Biggie	Weidmann Electrical Technology
Jaroslaw	Chorzepa	ABB
Rhett	Chrysler	ERMCO
Anthony	Coker	M&I Materials
Michael	Dahlke	Central Moloney, Inc.
Herton	De Oliveira Filho	PSE&G
Cesar	Dias	EATON Corporation
Jeffrey	Door	H-J Family of Companies
Sanford	Fong	Georgia Power Co.
Hector	Garza	Orto de Mexico
Ali	Ghafourian	H-J Enterprises, Inc.
Orlando	Giraldo	HJ Family of Companies
Michael	Hardin	H-J Enterprises, Inc.
John	Herron	Raytech USA
Martin	Munoz Molina	Orto de Mexico
*Vinay	Patel	Consolidated Edison Co. of NY
Daniel	Posadas	Prolec
Clemens	Reiss IV	Custom Materials, Inc.
Stefan	Schindler	Maschinenfabrik Reinhausen
Jeffrey	Schneider	Power Partners/Spire Power Sol.
Dan	Schwartz	Quality Switch, Inc.
Jeremy	Sewell	Quality Switch, Inc.
Russell	Sewell	Quality Switch, Inc.
Jaber	Shalabi	VanTran Industries, Inc.
Liz	Sullivan	Dominion Energy
Eric	Theisen	Metglas, Inc.
Timothy	Tillery	Howard Industries
Robert	Vantol	Commonwealth Assoc
Pragnesh	Vyas	Sunbelt Solomon
Shelby	Walters	Howard Industries
Bruce	Webb	Knoxville Utilities Board
Alan	Wilks	Consultant
Malia	Zaman	IEEE
Michael	Zarnowski	Carte International
Kyle	Zemanovic	EATON Corporation
* = requests member- ship		

## **Subsurface Transformers and Network Protectors Subcommittee Working Group Report**

The S22 meeting of C57.12.24 was called to order at 4:45 PM on Monday, March 28, 2022 in the Centennial F room of the Hyatt Regency in Denver, CO.

Tom Dauzat filled in for Chair Ben Garcia to run the meeting. Ben was present by way of a speaker phone. George Payerle acted as secretary. Introductions were made.

A member list was presented. C57.12.24 has 38 members. There 21 members present so quorum was achieved. There were 43 guests present. Patent and copyright slides were shown. Michael Zarnowski and Nabi Almeida are new member as of this meeting.

The chair presented an agenda. Will Elliott moved to accept the agenda and Dan Mulkey seconded. The motion passed. Will Elliott moved to accept the minutes of the previous (virtual) meeting from the fall of 2021. Dan Mulkey seconded and the motion was passed.

The main work of the meeting was continuing to revise C57.12.24.

There was discussion about removing reference to dates when standards are cited. This will eliminate the need for standards to be frequently updated to keep the references to other standards current. The users of C57.12.24 will be expected to seek out only the latest revision of C57.12.00. Dan Mulkey made a motion to remove all references to dates where standards are cited. Will Elliott seconded and the motion passed

Dan Mulkey moved to approve changes to the layout of the primary switches and fusing in figure 1, Nabi Almeida seconded, no objection, motion passed.

Simplify table 4 by removing the lower of the alternative HV connector ratings for 95 and 125kVBIL winding insulation levels (i.e. removing the 8.3kV option where the table previously stated "8.3kV or 15.2kV"). Motion was made by Nabi Almeida, Avi Shingari seconded. No objection, motion passed.

7.2.2 row 5 was changed to add the wording 'per ANSI/NEMA CC-1' after "...in accordance Figure 4 through Figure 8." This was in response to the question about dimensional and thickness tolerances of the A, B, C callouts in each figure. Dan Mulkey moved to add 'and ANSI/NEMA CC-1' reference. Dan moved; Nabi Almeida seconded. Motion passed.

Table 5, is a new table added to the standard to summarize all of the previously embedded tables in Figures 4 through 8 and place this consolidated information in one place at the end of the section.

A new table was also created and embedded into Figure 8 to include the thread stud secondary terminal dimensional requirements. This was added to figure 8 to replace the tables for fig 4 to 7 with table 5 showing the size of the stud and spade configuration. Nabe Almeida made the motion, John Vartanian seconded. The motion passed.

Table 5, change was made to the 500 kVA, 240V cell. The original callout for a 4 hole spade but it was changed to 6 hole spade to be consistent with the recommendation stated for the 500kVA, 208Y/120V cell (6 hole spade). Dan Mulkey made the motion. Will seconded. The motion passed.

7.2.3 line 13. The spacing requirement for the neutral bushing ground pad was changed from a minimum of 12" to 6" spacing from the bushing center. This change was made to address Ralph

## **Subsurface Transformers and Network Protectors Subcommittee Working Group Report**

Wegner's comment about there being a lot of components on the cover and how a 12" minimum could be problematic. Mike Zarnowski made the motion to do so, Will Elliott seconded. The motion passed.

7.3.1, line 7, change 'protective cap' to 'protective sealed cap' Brian Klaponski moved, Brad Kittrell seconded. The motion passed.

Stopped at 7.3.1 row 8 re dual voltage switches.

Per the chair, this will be the last working meeting to review and approve new changes. After this meeting, the chair will work with the STNP subcommittee team to submit a clean version of C57.12.24 to RevComm for formal review.

Next meeting Charlotte NC, Oct 16 to 20, 2022. The meeting was adjourned at 6:00 pm MST

Respectfully submitted...  
George Payerle, secretary, C57.12.24  
March 30, 2022

- **C57.12.40 Secondary Network Transformer** working Group –  
Dave Blew, Chairman, Dan Schwartz, Secretary
  - Published 2017
  - Revision due date: **12/31/2027**
  - PAR Approval Date: 8/31/2012
  - PAR Expiration Date: **12/31/2023**

Stage: Submitted to Revcom on RevCom Agenda 04-May-2017

## **IEEE Transformers Committee C57.12.40 Secondary Network Transformer Working Group**

### **Spring 2022 Denver Meeting Minutes**

**Hyatt Regency, Denver, CO**

**Mineral Hall B-C**

**11:00 AM MDT March 29, 2022**

#### **Members Present**

Dave Blew (Chair)  
Dan Schwartz (Secretary)  
Douglas Craig

#### **Company**

Consultant (Retired PSE&G)  
Quality Switch  
Richards Manufacturing Co.

**Subsurface Transformers and Network Protectors Subcommittee  
Working Group Report**

Tom Dauzat	Prolec GE
Larry Dix	Quality Switch
William Elliott	Prolec GE
Brad Kittrell	Consolidated Edison Co. of NY
Brian Klaponksi	Carte International Inc
Dan Mulkey	Mulkey Engineering Inc.
George Payerle	Carte International Inc.
James Ratty	Richards Manufacturing Co.
Adam Sewell	Quality Switch
Jeremy Sewell	Quality Switch
Russell Sewell	Quality Switch
Avijit Shingari	Pepco
Liz Sullivan	Dominion Energy
John Vartanian	National Grid

**Guests Present**

Joshua Adams  
Nabi Almeida  
Herton De Oliveira Filho  
Sanford Fong  
Ken Hampton  
Jack Harley  
\*Vinay Patel  
Bruce Webb  
Bill Whitehead  
\*Mike Zarnowski  
\*Requested Membership

**Company**

Quanta Underground Power Services  
Prolec GE USA  
PSE&G  
Georgia Power Co.  
BGE and Exelon Company  
First Power Group LLC  
Consolidated Edison Co. of NY  
Knoxville Utilities Board  
H2scan  
Carte International Inc.

- 1) The group met on Tuesday, March 29, 2022 at 11:00 AM MDT with 17 members and 10 guests. Two (2) guests requested membership. Quorum was achieved with 17/28 (61%) 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 George Payerle and seconded by Will Elliott. The agenda was approved unanimously.
- 5) The minutes of the November 16, 2021, meeting on WebEx were reviewed. A motion to approve was made by Jeremy Sewell and seconded by Adam 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 will apply for a two-year PAR extension in 2023 prior to expiration of the current PAR.

**Subsurface Transformers and Network Protectors Subcommittee  
Working Group Report**

- 7) Old Business - The Chair reviewed the previous meetings list of topics to be addressed in the next revision of C57.12.40 and the following items were discussed:
- a. **Primary Switch Testing** - Cory Morgan (Eversource) provided wording to update Section 6.2.2.3. Wording of the paragraph was updated by the group; the updated paragraph wording has been documented and will be updated in Rev1 of the new document. A motion was made to approve the changes by Liz Sullivan and seconded by Tom Dauzat. The motion was approved unanimously.
  - b. **Update of Tables 8 & 9** – A modified combination of Tables 8 & 9 (will be the new Table 7) were reviewed. A motion to approve the combined table was made by John Vartanian and seconded by Brian Klaponski. The motion passed unanimously. It was also agreed that these modifications to the document can be reviewed later prior to balloting.
  - c. **Tank and Throat Sizing** – Modified wording and removal of Table 7 was presented. Table 7 was removed, and the paragraph modified to reference Figures 3 and 4. A motion to approve the changes was made by Jeremy Sewell and seconded by Will Elliott. The motion passed unanimously.
  - d. **Bushing Standardization** – A discussion was held about the updated Appendix B. Dave Blew agreed to provide any updates to Appendix B for the next meeting in Charlotte.
  - e. **Cathodic Protection and Corrosion** – The work of the corrosion TF was discussed. The group decided it would be best to reference the in-progress Guide (C57.12.53), but because the new Guide would most likely not be approved before this standard, the group decided to maintain the current references in the standard until the next revision.
- 8) New Business – The Chair opened the discussion on any new items the group felt needed to be addressed in the next revision.
- a. New wording was discussed to address tank cover design and not allowing debris and fluids to settle on the tank cover. Wording was provided. A motion was made to approve the wording by Larry Dix and seconded by Dan Mulkey. The motion was approved unanimously. Additional wording will be discussed and provided prior to the next meeting by Larry Dix and Dan Schwartz.
- 9) The meeting was adjourned at 12:04 PM MDT with the next meeting set for Charlotte, NC on October 18, 2022.

Respectfully submitted,  
D. Schwartz, Secretary

**Document  
#:**

**PC57.12.53**

**Document  
Title:**

**Guide on Mitigating Corrosion on Subsurface Transformers**



**Subsurface Transformers and Network Protectors Subcommittee  
Working Group Report**

<b>Chair:</b>	<u>Will Elliott</u>	<b>Vice-Chair</b>	<u>Avijit Shingari</u>
<b>Secretary</b>	<u>Audrey Siebert-Timmer</u>	<b>Per Cent Complete</b>	<u>0</u>

**Current Draft Being Worked On:** 0 **Dated:** \_\_\_\_\_

<b>Meeting Date:</b>	<u>March 29, 2022</u>	<b>Time:</b>	<u>1:45 PM MST</u>
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<b>Attendance:</b>	<b>Members</b>	<u>19</u>
	<b>Guests</b>	<u>13</u>
	<b>Total</b>	<u>32</u>

**Attending Members:**

*William Elliott, Prolec GE*  
*Avijit Shingari, Pepco Holdings Inc.*  
*Audrey Siebert-Timmer, IFD Corporation*  
*Nabi Almeida, Prolec GE*  
*Dave Blue, Consultant*  
*Thomas Dauzat, Prolec GE*  
*Herton De Oliveira Filo, PSE&G*  
*John Harley, First Power Group LLC*  
*Brad Kittrell, Consolidated Edison Co. of NY*

*Brian Klaponski, Carte International Inc.*  
*Tyler Morgan, Duke Energy*  
*Daniel Mulkey, Mulkey Engineering Inc.*  
*Dan Schwartz, Quality Switch, Inc.*  
*Adam Sewell, Quality Switch, Inc.*  
*Jeremy Sewell, Quality Switch, Inc.*  
*James Spaulding, City of Fort Collins*  
*Liz Sullivan, Dominion Energy*  
*John Vartanian, National Grid*  
*Michael Zarnowski, Carte International Inc.*

**Attending Guests**

*Paul Chisholm, IFD Corporation*  
*Michael Dahlke, Central Moloney, Inc.*  
*Cesar Diaz, EATON Corporation*  
*Jeffrey Door, The H-J Family of Companies*  
*Douglas Craig, Richards Manufacturing Co.*

*Sanford Fong, Georgia Power Co.*  
*Joe Nims, Allen & Hoshall, Inc*  
[\*George Payerle, Carte International Inc.\*](#)  
[\*James Ratty, Electronic Technology Inc.\*](#)  
[\*Clemens Reiss IV, Custom Materials\*](#)  
[\*Russ Sewell, Quality Switch, Inc.\*](#)

**Subsurface Transformers and Network Protectors Subcommittee  
Working Group Report**

| [Timothy Tillery, Howard Industries](#)

*Shelby Walters, Howard Industries*

**Subsurface Transformers and Network Protectors Subcommittee  
Task force / Working Group Report**

# Subsurface Transformers and Network Protectors Subcommittee Meeting Minutes

## Meeting Minutes:

1. Will Elliott called the meeting to order at 1:45 PM MST.
2. Opening remarks and announcements.
  - i. As this is the first meeting, any attendee can request to be a member.
3. Will Elliott reviewed agenda. Hearing no requests for changes, the agenda was approved as written. As this is the first meeting there was no previous meeting minutes to approve.
4. Will Elliott reviewed IEEE Essential Patent Claims and SA Copyright Policy. No issues were raised.
5. New Business:
  - i. Will Elliott reviewed the approved PAR.
  - ii. Will Elliott requested nominations for the working-group officers.
    - a. **Brian Kaplonski made a motion to nominate Will Elliott as the working group Chair. Second by George Payerle. Motion passed unanimously.**
    - b. **Nabi Almeida made a motion to nominate Avijit Shingari as the working group Vice Chair. Second by Michael Zarnowski. Motion passed unanimously.**
    - c. **Tom Dauzat made a motion to nominate Audrey Siebert-Timmer as the working group secretary. Second by Paul Chisholm. Motion passed unanimously.**
  - iii. Will Elliott asked the group how we should proceed with the draft document which was created by the corrosion taskforce.
    - a. **Tom Dauzat made a motion to accept the current draft as the starting point. Document contents can be modified within the constraints of the approved PAR scope. Second by George Payerle. Motion passed unanimously.**
    - b. Group discussed the following:
      1. A question was asked if should limit the number or types of changes to make to the document. Group discussed the draft is a starting point and can be changed as needed if it is within the document scope.
      2. A suggestion was made to discuss what experience we have in the room (i.e. corrosion experts or material scientists).
        1. Jeremy Sewell from Quality Switch mentioned they have a material scientist who could review the draft.

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2. Tom Dauzat from Prolec GE mentioned he is a mechanical engineer with a materials background. He performed a number material tests for the taskforce.
  3. Brad Kittrel from ConEd mentioned they have corrosion experts. ConEd also has corrosion data can be shared.
  4. Avijit Shingari mentioned PEPCO have some corrosion experts who could review the draft.
  5. John Harley from First Power Group mentioned they have a corrosion expert who could review the draft and possibly attend the meeting.
  3. Group discussed that if we can get the corrosion experts to attend the meeting it would be beneficial. This could include corrosion experts that work on the transmission side or from other industries.
  4. Tom Dauzat suggested the scope to be further clarified as the document is a guide. It is designed to help the user to specify their requirements bases on the application.
  5. Brian Kaplonski commented that ideally that some items may be extracted to put into other standards (i.e. the good stuff).
- c. Will Elliott reviewed the taskforce draft document with the group. **Will Elliott requested the group to review the proposed draft and provide feedback to him by July 1, 2022.**
6. Next meeting: is planned for October 18, 2022 in Charlotte, NC USA
- i. The following attendees requested membership: William Elliott, Avijit Shingari, Audrey Siebert-Timmer, Nabi Almeida, Dave Blue, Thomas Dauzat, Herton De Oliveira Filo, John Harley, Brad Kittrell, Brian Klaponski, Tyler Morgan, Daniel Mulkey, Dan Schwartz, Adam Sewell, Jeremy Sewell, James Spaulding, Liz Sullivan, Michael Zarnowski,
7. The meeting was adjourned at 2:38 PM MST.
8. Subsequent to the meeting John Vartanian indicated that he intended to request membership during the meeting, and was granted membership.

Submitted by: Audrey Siebert-Timmer

Date: 03/29/2022

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Minutes presented by Dave Blew with comment that a PAR extension after the Spring 2023 is anticipated. There were no additional questions.

- **C57.12.44 Secondary Network Protectors** working group – Mark Faulkner, Chairman, Alex Macias, Secretary
  - Revision due date: **12/31/2024**
  - PAR Approval Date: **3/26/2015**
  - PAR Expiration Date: **12/31/22 In Ballot**

Stage: Being revised

No minutes presented. Chairman advised this was currently in ballot

- **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**

Minutes presented by Gary Hoffman with comment to the group thanking them for their input making for a better document

Motion made by member Gary Hoffman: Based on receiving 2/3rds approval by C57.167 WG, that they request to go to an SA ballot. 2<sup>nd</sup> Brian Klaponski.

- Discussion: Approved by SC. Gary Hoffmann also noted that a ballot resolution group has already been started in anticipation that there likely would be comments during the balloting process. Brian Klaponski sees this as a proactive approach to get in front of the comments and streamline the process
- No objections from the SC