TRANSFORMERS COMMITTEE
SPRING 2022 MEETING

March 16, 2022

Dear Committee Members and Guests:

You and your spouse/companion are cordially invited to Denver, Colorado, USA, to attend the spring 2022 meeting of the IEEE PES Transformers Committee, March 27–31. We look forward to welcoming you to the Mile High City, named one of the top two best destinations to live in the United States by *US News & World Report*! With parts of the city sitting exactly 5,280 feet above sea level, Denver is located on high rolling plains, 12 miles east of the "foothills," a series of gentle mountains that climb to 11,000 feet. Just beyond is the "Front Range of the Rocky Mountains," a series of stunning snowcapped peaks that rise to 14,000 feet, with 200 named peaks visible within the city limits. Denver boasts 300 days of sunshine each year, a thriving cultural scene, diverse neighborhoods, stunning architecture and award-winning dining, all of which have made it one of the fastest growing U.S. cities and one of the most visited by outdoor adventurers, art enthusiasts and foodies alike.

HOTEL INFORMATION: Our meeting will be held in the heart of downtown Denver at the Hyatt Regency Denver at Colorado Convention Center, 650 15th Street. Offering three regionally-inspired restaurants, well-equipped fitness center, indoor lap pool, comfortable rooms and suites, the Hyatt Regency offers views of the Rocky Mountains and the city's dramatic skyline. Adjacent to the Colorado Convention Center and just one block from shopping at 16th Street Mall, this contemporary luxury hotel is close to some of the city's most popular historic, cultural, dining and entertainment venues.

Our discounted guestroom rate at the hotel starts at US$189 per night and includes complimentary wireless internet in guestrooms and hotel public space as well as complimentary fitness center access for all overnight guests. Visit the Committee's website for a link to reserve a room, or if you call the hotel, mention "IEEE Transformers" to receive the group rate. The cut-off date for the group rate is Wednesday, March 2, but we expect the hotel to sell out before this date.

GETTING THERE: The Hyatt Regency is located approximately 25 miles/40 km east of Denver International Airport (DEN). Taxi fare is approximately US$70 one way from the airport, and taxis are required to accept credit card payments. UBER and Lyft (starting at approximately US$32) are also approved for ridesharing at the Denver International Airport. Additionally, mass transit options are available starting at US$2 one way. Underground hotel covered self-parking located off 14th and Welton Streets is US$42/car per night. Valet parking is also available at a rate of US$52/car per night.

MEETING REGISTRATION: Register on-line for the meeting, Sunday night reception, Monday and Tuesday lunches, spouse/companion Monday tour and Tuesday activity (this link can also be found on the Committee website Next Meeting page): https://cvent.me/yqYy5o. Register by **Wednesday, March 2**, to receive a US$50 early registration discount. The on-line registration system will be disabled on Wednesday, March 23 to print name badges and finalize counts. The cost to register on-site is substantially higher than the advance registration price, and some events may not be available for on-site registration.

WEATHER: March temperatures in Denver are typically comfortable during the day and quite a bit cooler at night with only a tiny chance of rain (average high of 58°F/14°C and low of 29°F/-2°C). While March can be one of Denver's snowiest months, the snow often melts quickly once the sun comes out (remember: 300 days of sunshine annually!). Our spouse/companion tour on Monday does include some shopping time that will require participants to be outside and the hotel is within walking distance to a TON of great restaurants, so we are hoping for these averages to play out on the high side! Dress for the meeting is business casual.

SUNDAY EVENING WELCOME RECEPTION: The reception will be held inside the Hyatt Regency's beautiful Centennial A Ballroom from 6pm to 8pm, featuring live music, a variety of fantastic food and cash bars. Please indicate whether you will attend this reception during the meeting registration process.

SPOUSE/COMPANION TOUR & ACTIVITY: Monday's **Experience Estes Park** tour starts with an early breakfast at the hotel, so the bus can leave by 8:30am to navigate through the mountains to beautiful Estes Park. Accompanied by an energetic and fun guide, attendees will arrive at the Stanley Hotel for a private tour of one of the U.S.' most haunted hotels. Afterwards, the group will head to lunch at an Estes Park favorite restaurant, followed by time to explore the quaint downtown shops before heading back to the hotel.

Tuesday morning's activity is all about relaxation and learning a unique form of art called **Zentangle®**. Taking place right at the Hyatt Regency, award-winning artist and certified Zentangle instructor, Annie Reiser, will help participants create beautiful art using basic pen strokes to form structured patterns in a stress-free environment. No drawing experience is required!

See flyers for details and register early as attendance is extremely limited.

NO TECHNICAL TOURS OR WEDNESDAY NIGHT DINNER SOCIAL: Many venues are not yet booking events or tours. We hope to be able to offer these types of activities again during the fall meeting in Charlotte.

ADDITIONAL MEETING INFORMATION: Along with this invitation letter, additional meeting information can be downloaded from the Committee's website at www.transformerscommittee.org/meetings/2022-spring-denver-meeting/:

- Registration Fees Summary – Review all fees before logging into the registration system.
- Meeting Schedule and General Sessions Agenda – If any noteworthy changes are made, an updated schedule will be posted on the Committee's website a few days prior to the meeting.

We are certain you will enjoy all of what Denver has to offer and look forward to seeing you at the spring 2022 meeting!

Best regards,

Jeff Gragert
Spring 2022 Meeting Host

Xcel Energy®

IEEE PES TRANSFORMERS COMMITTEE
Spring 2022 Meeting
Denver, Colorado USA

~ Meeting Registration Fees Summary ~

– Register on-line with credit card or wire transfer (extra fee applies for wire transfer) at the registration link posted on this page: https://www.transformerscommittee.org/meetings/2022-spring-denver-meeting/; contact the Committee at tc-meetings@ieee.org if an alternate form of payment is necessary.
– Each individual must register for meeting and pay appropriate registration fee to attend any meeting, meal, social event or tour.
– Print a receipt at the end of the registration process; paper receipts NOT provided at the meeting.
– Refund provided only if request received by Wednesday, March 23 and valid once confirmation email received – US$25 service charge for a refund of entire registration or US$10 for a partial refund; SEE REGISTRATION SITE FOR COVID REFUND POLICY EXCEPTION.
– US Tax ID No. 13-1656633, Canadian Business No. 12563 4188, Euro Tax Registration No. EU826000081

REGISTRATION FEES AS SHOWN BELOW – all fees in US dollars – all fees stated are per person	**On or Before March 2**	**After March 2, on or before March 23**	**On-site (at Meeting)**
MEETING REGISTRATION			
Attendee — IEEE member (will be verified with IEEE)	$340	$390	$490
Attendee — non-IEEE member	$410	$470	$590
Attendee — IEEE Life or Committee Emeritus (will be verified)	$110	$160	$260
Spouse/Companion or Guest* and children age 12 and over	$140	$190	$290
– Attendee registration fee includes Sunday night welcome reception, entry into meeting area, coffee breaks and four breakfasts (Mon, Tues, Wed, Thurs) – Spouse/Companion registration fee includes Sunday night welcome reception, four breakfasts (Mon, Tues, Wed, Thurs) and ability to register for tours/activities			
* This fee category is for anyone who is attending for non-commercial reasons, i.e. not attending the technical meetings, etc. Spouses/Companions/Guests, including children (age 12 and over) must be registered for the meeting with above meeting registration fees to attend any tour, social event and/or breakfasts.			
LUNCHEONS			
Monday Standards Development Luncheon – All SC, WG, TF leaders are encouraged to attend – Buffet lunch (no meal selection required)	$20	$20	$20
Tuesday Awards Luncheon – Meal selection required at registration - indicate beef, chicken or vegetarian	$30	$30	$30
SOCIAL EVENTS (see flyers for details)			
Sunday Night Welcome Reception: Centennial A Ballroom – Hyatt Regency Denver	included in registration fee; *please register in advance for headcount purposes*		
SPOUSE/COMPANION TOUR & ACTIVITY (Monday tour includes lunch; see flyers for details)			
Monday Tour: Experience Estes Park**	$110	$110	$110
Tuesday Activity: Zentangle Beginner Drawing Class**	$45	$45	$45
** Attendance will be limited to 25 people for spouse/companion tour and activity due to capacity constraints, so register early! *On-site registration for these events only available if space allows.*			

IEEE PES TRANSFORMERS COMMITTEE

Spring 2022 Meeting: Denver, Colorado

Agenda - General Sessions

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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Opening Session

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

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

1. Welcome and Announcements ..... Ed teNyenhuis
2. Meeting Minute ..... Tammy Behrens
3. Approval of Agenda ..... Ed teNyenhuis
4. Approval of Minutes from Fall 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

IEEE PES TRANSFORMERS COMMITTEE

SPRING 2022 MEETING: MARCH 27 TO MARCH 31

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

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				Centennial A (3)

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.

IEEE PES TRANSFORMERS COMMITTEE

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	~~TF Partial Discharge Tests for Class I Transformers~~	~~DiTests~~	~~D. Ayers~~	~~I~~	~~Centennial D-E~~ **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. Hochanh	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	~~TF Next Revision to C57.104 Guide for DGA in Mineral Oil~~	~~IF~~	~~C. Beauchemin~~	~~N~~	~~Centennial D-E~~ **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

IEEE PES TRANSFORMERS COMMITTEE

SPRING 2022 MEETING: MARCH 27 TO MARCH 31

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

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 - Advance on-line registration required - Class takes place at the Hyatt Regency in Quartz A-B (3) - ATTENDANCE IS LIMITED - See flyer for details	Tour			
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 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.				Centennial A (3)
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

IEEE PES TRANSFORMERS COMMITTEE

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)

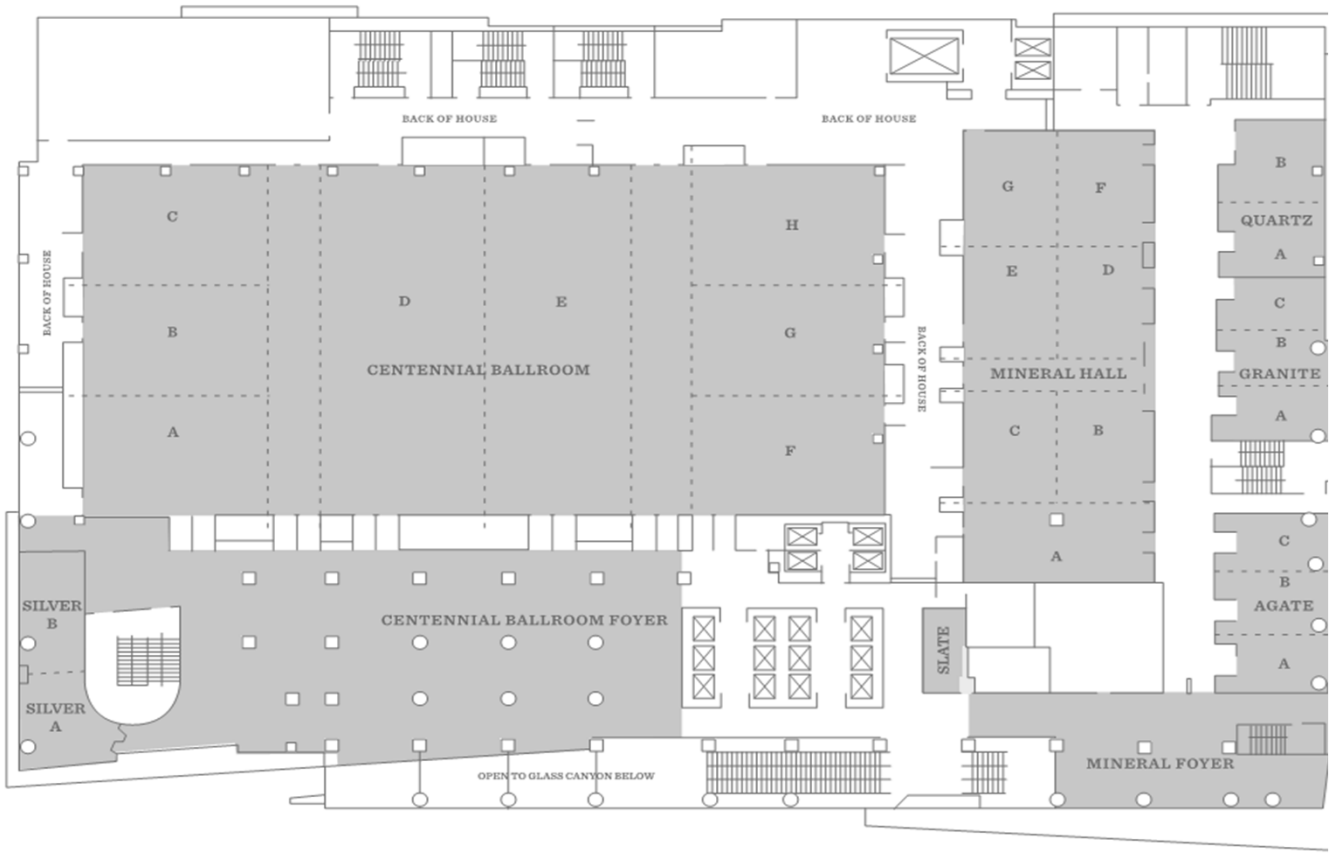
*** Contact Ed Smith (edsmith@ieee.org) if you are interested in sponsoring a day of coffee breaks at a future meeting.**

**** 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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IEEE PES TRANSFORMERS COMMITTEE

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	
3/30/2022	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	~~TF Partial Discharge Tests for Class I Transformers~~	DiTests	D. Ayers	Centennial D-E	**CANCELLED**
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	~~TF Next Revision to C57.104 Guide for DGA in Mineral Oil~~	IF	C. Beauchemin	Centennial D-E	**CANCELLED**
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 Matrs 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. Sankarakurup	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)	

IEEE PES TRANSFORMERS COMMITTEE

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
3/28/2022	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

SPOUSE/COMPANION TOUR
Monday, March 28, 2022
Experience Estes Park

Your day begins with an approximate 1½ hour scenic drive to Estes Park, Colorado. Upon arrival in this quaint city surrounded on all sides by awe-inspiring Rocky Mountain peaks, your first stop is at the Stanley Hotel for a private, guided walking tour of what is considered one of the most haunted hotels in the U.S. Built as a labor of love by entrepreneur F.O. Stanley and his wife, Flora, the Stanley Hotel opened on Independence Day 1909 and offers views of Lake Estes and Longs Peak. While its colonial revival architecture and age establish it as a unique place to visit, an unexpected one-night stay in late September 1974 by Stephen King and his wife, Tabitha, is what gave the hotel its notoriety. Inspired by his eerie experiences in a nearly empty hotel, including employee stories of encounters with spirits and a terrible nightmare, King wrote the best-selling novel-turned-movie, *The Shining*. www.stanleyhotel.com

Following the hotel tour, lunch is served at Claire's Restaurant and Bar which has been serving Estes Park since 1992. Claire's strives to use the freshest ingredients available and locally sourced products whenever possible. Following lunch, you will have a short time to walk around the shops in the downtown area of Estes Park before heading back to Denver. www.visitestespark.com/blog/post/a-visitors-guide-to-downtown-estes-park

Mike Pearl, a 3rd generation Colorado native, will be your docent for the day. He is retired from public high school classroom teaching and now guides visitors from all over the world as a professional, certified tourist guide. He received "Colorado Certification" from the Rocky Mountain Tour Guides Association and currently serves as the association's president. Mike earned a Ph.D. in Theater Education and is a veteran of the US Army.

DRESS FOR THE WEATHER AND WEAR COMFORTABLE WALKING SHOES!

Lunch Menu

Please advise of any special dietary needs at registration.

ENTRÉE CHOICES*:

- Santa Fe Salad with All-Natural Chicken
- Smoked Brisket Grilled Cheese and Fries
- Smoked Salmon Salad Sandwich and Fries
- Chef's Chicken Sandwich and Fries

// all entrees served with choice of dessert (chocolate cake or bread pudding) as well as coffee, tea or soft drink //

*Entrée choices will be detailed for you and collected during morning bus ride.

Itinerary (times are approximate)

~ Bottled water and snacks provided on bus. ~

7:00 am:	Breakfast in Peaks Lounge on the 27th Floor of the Hyatt Regency (to-go boxes will be available)
8:30 am:	Depart Hyatt Regency on coach bus for Estes Park (bus pickup at hotel's main entrance)
10:00 am:	Arrive at the Stanley Hotel (time to browse the gift shop, use the restroom, purchase a snack, etc.)
10:45 am:	Private, guided tour of the Stanley Hotel (tour does involve climbing some stairs)
12:00 pm:	Depart the Stanley Hotel for lunch at Claire's
1:15 pm:	Explore the shops in downtown Estes Park
2:00 pm:	Depart for Hyatt Regency

Meeting hosted by

Attendance is limited to 25 people...REGISTER EARLY!

SPOUSE/COMPANION ACTIVITY

Tuesday, March 29, 2022

Zentangle® Beginner Drawing Class

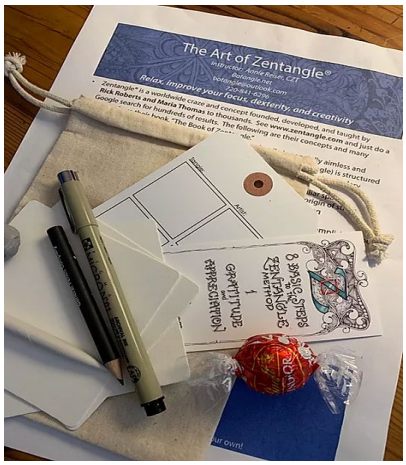
Zentangle® is a worldwide art form and method founded, developed and taught by Rick Roberts and Maria Thomas to thousands since its origin. Even though the name has "zen" in it, Zen Buddhism is not taught nor is any religion. Instead, you are taught how to create beautiful art using structured patterns, called "tangles." These tangles are drawn on small pieces of paper called "tiles" that can be assembled into mosaics. www.zentangle.com

Annie Reiser, certified Zentangle® teacher and botanical illustrator, enjoys introducing others to this meditative practice of mindful drawing, a technique using basic pen strokes to form patterns that can be combined into beautiful and intricate designs. The beauty is that no drawing experience is required! If you can make a dot, a straight line, a curved line and a circle, you have all the skills you need. Learn to relax, improve your focus, creativity and dexterity as you learn the philosophy and creative "ceremony" of Zentangle®.

About Your Teacher

Coming full circle, Annie has returned to what feeds her soul: art. Years ago, Annie pursued a degree in art and got sidetracked by life. Family and career took her down other pathways, although art has always been a lifetime companion. She has a Master of Arts degree in German and is a graduate of the Denver School of Botanical Art & Illustration, where she taught part-time. Annie retired from her day job at the National Oceanic and Atmospheric Administration (NOAA) in Boulder, CO in December 2019 and jumped in full-time to develop her art business, www.Botangle.net, that includes teaching a variety of art classes.

A potter, spinner, knitter, weaver and painter, Annie is an active member of the Rocky Mountain Society of Botanical Artists and the Guild of Natural Science Illustrators. Her artwork has been displayed in juried shows and published in books. In 2017, she was part of an 11-person exhibit by the Denver School of Botanical Art & Illustration that received a Group Gold Medal Award from the Royal Horticultural Society at their annual botanical art show for the exhibit "Rocky Mountains: Plants and Funghi with Altitude."



Itinerary (times are approximate)

10:00 am: Class begins with a brief introduction of Zentangle® followed by step-by-step, hands-on instruction as you create your own art

12:00 pm: Class ends

Annie will have some of her art on display in the classroom which will be available for purchase at the end of class, if interested.

Class Location: Quartz (3rd Floor of the Hyatt Regency)

Meeting hosted by

Attendance is limited to 25 people...REGISTER EARLY!

IEEE PES Transformers Committee
Spring 2022 Meeting
Online/Virtual

Dual-Rated Distribution Transformers

— Technical Presentation —
Thursday, March 31, 2022

By Phil Hopkinson, Dan Mulkey, Steven Rosenstock, Kevin Rapp, Casey Ballard, Tom Prevost, Al Traut

1. Abstract

Transformer power ratings are defined as the amount of output power that can be delivered without exceeding nameplate temperature rise. Materials improvements have led to greater output ratings and smaller physical sizes. However, mandatory energy efficiency requirements by the U.S. DOE and physical design restraints for smaller units have resulted in designs that are not limited by the rated temperature rise, and loading guides have struggled to accurately reflect true capability. Distribution transformer loading studies show generally light loading but confusion for load-ability. New high thermal class fluids and improved solid insulating materials for liquid-filled transformers are timely for expected major increased loads due to electric vehicle charging and greater heat pump use and suggest new dual nameplate ratings for distribution transformers. The base rating would continue to reflect traditional kVA parameters, while the second rating would be the nameplate kVA rating based on thermal class of the insulation system. This panel examines several factors to show the usefulness of this proposed change.

2. Learning Objectives

This tutorial provides the following learning opportunities:

- A look at present loadings
- EEI forecast of loading increases to be expected
- We see RMS-equivalent loading not exceeding 50% of nameplate ratings but peak loads in present transformers will go well beyond nameplate
- Higher loading normally means higher temperature rises
- New solid and liquid insulating materials appear to be able to handle considerably higher top-end loading without size increases in new dual kVA nameplate transformers
- We have examined new hypothetical designs that look particularly interesting
- Summary of what we see for dual kVA nameplate designs

3. Learning Outcomes

By attending this tutorial, attendees will gain an understanding of the following:

- Present day transformers are lightly loaded; new loading will increase up to 50% over the next 10 years from electric vehicle charging and new electric heat pump conversions
- RMS-equivalent loads will get close to DOE assumption of 50% of nameplate kVA, but peak loads will go well beyond nameplate
- New thermal materials in new designs can handle the higher loading without change to physical size
- New dual kVA nameplate designs can meet DOE electrical efficiency and handle new peak loads

4. Presenters' Biographies

Phil Hopkinson is a Life Fellow of IEEE and presently working as President and CEO of HVOLT Inc. in Charlotte, North Carolina, a position that he has held for 21 years. His 56-year career includes design and engineering management assignments at GE, Cooper and Square D/Schneider. Phil has a BSEE from Worcester Polytech, a Masters of System Science from Brooklyn Polytech and is a graduate of GE's Advanced Engineering Courses A-B&C. He is a registered PE in North Carolina and is Technical Adviser to the USNC for Power Transformers, IEC TC 14, a position he has held since 1996. Phil holds 15 U.S. patents and is a long-time member of the IEEE Transformers Committee.

Dan Mulkey is Vice President of Mulkey Engineering Inc., offering consultation and expert witness testimony on distribution power matters—with specialization in distribution transformers—since 2015. Prior to that, Dan had 42 years with Pacific Gas & Electric Company designing, maintaining and operating electric power distribution systems. Dan graduated from Fresno State University with a BSEE and is a registered PE in the State of California. He is a Life member of IEEE, holding numerous working group and task force chair positions and currently serves as chair of the Padmount Enclosure Integrity working group.

Steven Rosenstock is Senior Manager of Customer Technical Solutions with the Edison Electric Institute (EEI) in Washington, DC. Steve is a registered PE in Virginia and has dealt with distribution transformer energy efficiency issues for many years. In EEI, he constantly collects electrical use forecasts and has a tremendous depth of data that has been extremely useful in looking ahead to the future of our electrical systems.

Kevin J. Rapp is the Principal Scientist for the Global Dielectric Fluids business of Cargill since June 2012. Previously, Kevin spent 36 years with Cooper Power Systems, including 27 years in R&D where he co-invented Envirotemp™ FR3™ fluid and found that ester liquids enhance the life of cellulose insulation which can extend the life of an insulation system in transformers. He earned his BS in Chemistry from the University of Wisconsin-Parkside. Kevin is involved in many international standards working groups as Technical Advisor/Chairman of the USNC of ANSI/IEC TC10 (insulating fluids), USNC technical expert of IEC TC 14 (power transformers), ASTM D27.15 and D27.91 insulating fluids subcommittees. He received the IEC 1906 Award in 2011, the US-EPA Presidential Green Chemistry Award in 2013 for the FR3 fluid in transformer development, an ASTM Service Award in 2015 and was installed as an ASTM Fellow with the Distinguished Merit Award in May 2018. He holds many patents and has published numerous papers. Kevin is a member of ACS, ANSI, AOCS, ASTM, CIGRE, IEC and IEEE.

Tom Prevost is a senior member of IEEE. He is the Vice President of Technology and Innovation in the Americas region for Weidmann Electrical Technology, where he has worked for 30 years. He has a BSEE degree from Virginia Tech. Tom is active in ASTM committee D27 on Insulating Fluids, CIGRE A2 & D1 Committees, IEC TC 14 and the IEEE Transformers Committee. He has written many technical papers on the subject of electrical insulation materials, transformer diagnostics and condition monitoring.

Casey Ballard is currently employed by DuPont, where he is the Global Technology Manager for the company's Electrical Infrastructure business. Casey has had an extensive background in dry type transformers, where he recognized the importance of Nomex® solid insulation for its extraordinary dielectric, mechanical and thermal strength. He also is extensively involved with liquid-filled transformers, where he increasingly sees similar benefits as in the dry type. Casey is a graduate of Virginia Polytechnic Institute and State University and a Senior Member of the IEEE Transformers Committee, leading the Dry Type Transformers Subcommittee.

AL Traut is a transformer engineer with over 40 years of experience in the design, development, manufacture and application of liquid-filled distribution transformers. Al has held numerous positions in engineering and engineering management with Cooper Power Systems, General Electric, Kuhlman Electric, Power Partners and Howard Industries. He received his BS in Electrical Engineering from Northwestern University and is a registered Professional Engineer in Wisconsin. Al is an active member of the IEEE Transformers Committee and is presently Working Group Chair for Overhead Pole-Mounted Transformers.