Dielectric Tests Subcommittee

October 21st, 2020
Virtual meeting

Dielectric Tests Subcommittee		
Chair: Ajith M. Varghese	**Vice-Chair: Thang Hochanh**	**Secretary: Poorvi Patel**
Room: Virtual	Date: October 21st 2020	Time: 11:00 am to 12:15 pm
Members: 137	Present at time of checking: 98	Present to AM System:
Guests present: 133	Membership requested:	Membership accepted:

B.1 Chair's Remarks

The Chair welcomed members and guests to the first virtual 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. This is especially important in a virtual setting. The chair also reminded that IEEE and transformer committees are non-commercial organizations and standards shall focus only on developing performance and functional requirement and not design and construction details.

The Unapproved minutes from the Fall 2019 meeting and the agenda for Fall 2020 meeting was sent out to members and guests 14 days before the Fall virtual meeting, and it's also posted on the website. The Spring 2020 meeting was cancelled due to Covid-19 pandemic.

All TF and WG **MUST** record the attendance in the AM System (no expectations that the meeting was held in an virtual setting) - The WG/TF minutes do not need to include the list of attendees. The attendance for the virtual meetings should be recoded with the Poll feature in Webex and WG/TFs are urged to keep website information current. Any presentation presented during the meetings should be posted.

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

The Chair reminded the WG and TF leaders to submit their minutes from the meetings within **15 days** to the SC chair and secretary. The SC Secretary then must submit the SC minutes within 45 days of the SC meeting. To minimize revision and errors in the sub-committee level and transformer committee level minutes, please send the final version of your minutes.

The Chair advised the WG/TF leaders to in advance before the DTSC meeting to submit any important motions or new Agenda to be discussed and approved during the DTSC meeting to the Chair.

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

There is changes to copyright policy – WG/TF leaders must show the slides for the copyright policy at the beginning of the WG/TF meeting

- 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

- Secretary to record in the minutes of the relevant meeting: That the foregoing information was provided and that the copyright slides were shown (or provided beforehand).

The Subcommittee chair showed the slides of the new copyright policy to the DT subcommittee members and guests.

Per new guidelines from IEEE, Audio/Video recording or photography is not allowed during SC, WG and TF meetings. In this virtual setting the sessions will be recorded and sent to the secretary for assisting in writing the minutes of meeting. The recording will be deleted after the use.

The Chair shared details of upcoming PES sponsored meeting as well as details of next transformer committee. The Spring committee meeting 2021 will be held in Toronto, Canada on the 25th -29th of April 2021. In late December 2020 or early January 2021- decision will be taken if this meeting will again be virtual due to the Covid-19 pandemic. Fall meeting 2021 will be held in Milwaukee, WI on the 17th -21st of October 2021. The Spring 2022 meeting is planned to be in Denver, CO on March 27th to 31st .

The Current Status of PARs was presented by The Chair.

- C57.127 Guide for the Detection of Acoustic Emissions from Partial Discharges in Oil-Immersed Power Transformers was published in 2019. Next revision 2028.

- C57.160 Guide for the Elec. Measurement of PD in HV Bushing and Instrument Transformers is in ballot resolution. The guide expires 2020. Par is exteded to 2022.

- C57.113 Recommend Practice for Partial Discharge Measurement Power - Par expires 2021. The guide expires in 2020. The Par may need extension.

- C57.98 Guide for Transformer Impulse Tests. The Guide expires 2021 and Par expires in 2022. No major changes needed, so should be in good shape.

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

- C57.161 Guide for DFR Measurements is approved and published 2018. There is no activity on as the guide as it does not expire until 2028.

- C57.168 Low-Frequency Test Guide is a new guide; PAR expires 2022.

- C57.200 Bushing Frequency Domain Spectroscopy Guide (ENTITY WG) is a new guide. PAR expires in 2022. There was no TF this Fall 2020.

If PAR extension is needed the last date for that next year is **18 October 2021**.

Since C57.12.00 and C57.12.90 are soon due to revision, the Chair presented highlights on topics that has been approved at the DTSC/WG/TF meetings previously or are in progress of changes in related TF/WG.

Affected Test/Area	Highlight of change *	TF/WG Chair	C57.12.00	C57.12.90	TF/WG	DTSC
External Clearances	New Clearance Table -Addition of line to ground and changes to phase to phase clearances	Eric Davis	6.8	NA	Approved	Approved
Switching Surge	Select Tap that will test LV close to its BSL Test on bridging position (Reactive LTC)	Pierre Riffon	NA	10.2.4	Approved	Approved
Impulse Waveform Front Time/Overshoot	Limit max front time to 2.5µs (regardless of overshoot). Clarity on IEEE 4 compliance	Pierre Riffon	NA	10.3.1.1	Approved	Approved
Chop Wave -Time from point of chop to voltage zero	Additional clarity on accepting Chopwave if 1µs limits can't be acheived	Pierre Riffon	NA	10.3.1.3	Approved	Approved
Terminals not being tested	Clarity on condition of non-impulsde terminal (ground/Float) during Impulse	Pierre Riffon	NA	10.3.2.1	Approved	Approved
PD Testing - **wound Core**	New Design Test and Limits for Wound Core Transformers	B. Griesacker P. Hopkinson	6.7.2.1 & Table 17	10.7.7	Approved	Approved

Affected Test/Area	Highlights of change *	TF/WG Chair	C57.12.00	C57.12.90	TF/WG	SC
Induce Test Tap	Select Tap that will test LV close to table 4. Test on bridging position (Reactive LTC)	B. Griesacker Bertrand	NA	10.8.1	Approved	Approved
Pressure during Induce	No artificial pressure during testing	B. Griesacker	NA	10.8.2	Approved	Approved
PD acceptance Limit Class II Transformer	1 Hour PD Limits <250pC Increase >50pC	B Griesacker V Mehrotra	NA	10.8.5	Approved	Approved
PD in Bushing during FAT	Address concern with bushing Venting to pass Transformer PD Testing	B Griesacker	NA	10.8.5	Not Approved**	
PD Testing Class I Transformers	Test Method and Acceptance limit for Class I when PD test is requested	B Griesacker D Ayers	5.10.5.3	TBD	Not Approved **	
Cap PF & Megger- Limits	Recommend Limits for FAT/Commissioning	Diego Robalino			Not Approved **	

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

In Columbus Fall of 2019 meeting 12 guests requested membership and 8 members where granted and 7 members were moved to guest status. The total membership of the Dielectric Subcommittee is today 137 members. To obtain Quorum 68 members is required. No meeting was held in Spring of 2020.

B.2 Quorum, Approval of Minutes and Agenda

In this virtual meeting the quorum was performed with the WebEx pooling system. According to the poll results total attendance were 231. Members attendance was 98. And 39 requested membership. However, the polling results with the names was lost. Please contact the Chair or the Secretary if you had requested membership.

Attendance Summary

	Webex
Total Attendees	231
Total # Of Members	137
Members Present	98
Quorum Present	YES (71.5%)

The virtual DTSC meeting had quorum.

The chair presented the agenda, and it was unanimously approved.

The minutes of the Fall 2019 meeting at Columbus meeting was approved unanimously.

B.3 Taskforce and Working Group Reports

B.3.1 Working Group Low-Frequency Dielectric Testing for Distribution, Power and Regulating Transformers

Unapproved Meeting Minutes
Virtual - WebEx | October 20th, 2020 | 9:25 – 10:40 AM CDT

Chair: Dan Sauer
Vice Chair: -
Secretary: -

Meeting Attendance
The working group met at 9:30am. There were 94 attendees and 13/36 members present. Quorum was not achieved.

Attendance

	WebEx
Total Attendees	94
Total # Of Members	36
Members Present	13
Quorum Present	36.1%

Discussions
- No essential patent claims noted.
- The IEEE copyright policy was shown, no objections were noted.
- The chair noted that the WG is currently seeking a secretary.
- The agenda of the Fall 2020 meeting and the minutes of the Fall 2019 meeting were not approved due to lack of a quorum.

Old Business
- Section 6 –Induced Testing.
    - Class 1 induced testing was reviewed, the wording “winding to ground appears twice, once is sufficient. The draft will be updated accordingly.
    - The 3.46x + 1000V not to exceed applied levels for single bushing transformers and wye connected and grounded three phase transformers is not addressed. Gary King agreed to provide further info on this type of testing.
    - Class 2 induced testing with PD was extensively reviewed by Bertrand.

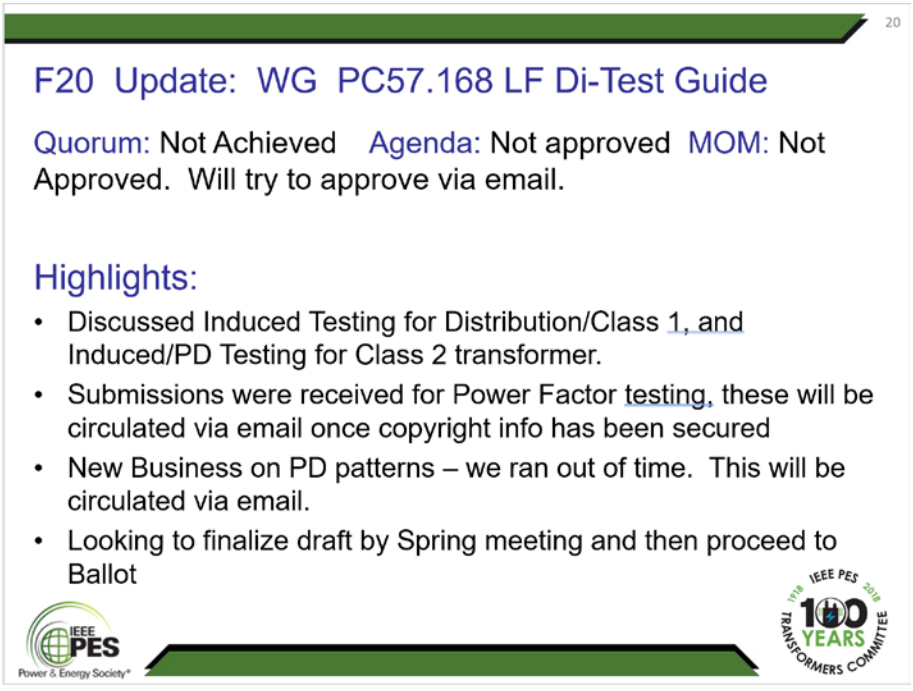
        - 200% nominal system voltage info to be removed from class 2 wording and the draft will be updated accordingly.
        - The tables & graphs for the PD info are to be side by side
            - Such as 6.3.20 & 6.3.21
            - Also 6.3.30 & 6.3.31
            - Also 6.3.36 and so forth
            - The draft will be reviewed and corrected as needed
            - The draft will be reviewed to ensure that formatting in the document follows what was sent by Bertrand
- Time ran out before a review of the two submitted sections for insulation power factor could be reviewed.
    - These will be circulated via email by the chair for review

New Business

- There was a request by Raja Kuppuswamy to include information in the document on PD pattern recognition. Time ran out before this business could be discussed. The chair agreed to circulate this info to the members & guests for review
- The chair mentioned that the PAR is valid until December 2022, and with that in mind the document should be finalized at the Spring meeting and sent to ballot to permit time to resolve any negative comments.

Meeting adjourned without a motion as time ran out.

Dan Sauer



Role	First Name	Last Name	Company
Guest	Dennis	Marlow	DenMar TDS Transformers
Guest	Jerry	Murphy	Reedy Creek Energy Services
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	Barry	Beaster	H-J Enterprises, Inc.
Member	Bertrand	Poulin	Hitachi ABB Power Grids
Member	Stephen	Jordan	Tennessee Valley Authority
Guest	Gary	King	Howard Industries
Guest	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Loren	Wagenaar	WagenTrans Consulting
Guest	Donald	Ayers	Ayers Transformer Consulting
Member	Wallace	Binder	WBBinder Consultant
Guest	Philip	Hopkinson	HVOLT Inc.
Guest	Christopher	Baumgartner	We Energies
Guest	Christoph	Ploetner	Hitachi ABB Power Grids
Guest	Alain	Bolliger	HV TECHNOLOGIES, Inc.
Guest	Reto	Fausch	RF Solutions
Guest	Michael	Haas	Instrument Transformers, LLC
Guest	Robert	Ganser	Transformer Consulting Services, Co.
Guest	Thang	Hochanh	Surplec Inc.
Guest	Waldemar	Ziomek	PTI Transformers
Guest	Vinay	Mehrotra	SPX Transformer Solutions, Inc.
Guest	Eric	Davis	Burns & McDonnell
Member	Shibao	Zhang	PCORE Electric
Guest	David	Wallach	Duke Energy
Guest	Stephen	Shull	BBC Electrical Services, Inc.
Guest	Dharam	Vir	SPX Transformer Solutions, Inc.
Guest	Abderrahmane	Zouaghi	Hitachi ABB Power Grids
Member	John	Herron	Raytech USA
Guest	Rodrigo	Ocon	Industrias IEM
Guest	Hakan	Sahin	Independent
Guest	Eric	Weatherbee	PCORE Electric
Member	Brian	Penny	American Transmission Co.
Guest	Shamaun	Hakim	WEG Transformers USA Inc.
Member	Daniel	Blaydon	Baltimore Gas & Electric
Guest	Xose	Lopez-Fernandez	Universidade de Vigo
Chair	Daniel	Sauer	EATON Corporation
Guest	Aleksandr	Levin	Weidmann Electrical Technology
Member	Ajith	Varghese	SPX Transformer Solutions, Inc.
Guest	Baitun	Yang	R.E. Uptegraff
Guest	Jeffrey	Schneider	EATON Corporation

Role	First Name	Last Name	Company
Guest	Ali	Naderian	Metsco
Guest	Shankar	Nambi	Bechtel
Guest	Jos	Veens	SMIT Transformatoren B.V.
Guest	Leopoldo	Rodriguez	Transformer Testing Services LLC
Guest	Thomas	Melle	HIGHVOLT
Guest	Mark	Lachman	Doble Engineering Co.
Member	Fernando	Leal	Prolec GE
Guest	Ronald	Hernandez	Doble Engineering Co.
Guest	Aniruddha	Narawane	Power Distribution, Inc. (PDI)
Guest	Steven	Brzoznowski	Bonneville Power Administration
Member	Detlev	Gross	Power Diagnostix
Guest	Kushal	Singh	ComEd
Guest	Christopher	Whitten	Hitachi ABB Power Grids
Guest	Markus	Schiessl	SGB
Guest	Rhett	Chrysler	ERMCO
Member	Christopher	Slattery	FirstEnergy Corp.
Guest	Anthony	Franchitti	PECO Energy Company
Guest	William	Larzelere	Evergreen High Voltage
Guest	Anand	Zanwar	Siemens Energy
Guest	Tim-Felix	Mai	Siemens Energy
Member	Jorge	Cruz	PTI Transformers
Guest	Jinesh	Malde	M&I Materials Inc.
Member	Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden
Guest	Trevor	Mattson	Schweitzer Engineering Labs
Guest	Dominique	Bolliger, Ph.D.	HV TECHNOLOGIES, Inc.
Guest	Raja	Kuppuswamy	Dynamic Ratings, Inc.
Guest	Malia	Zaman	IEEE
Member	John	Foschia	SPX Transformer Solutions, Inc.
Member	Cihangir	Sen	Duke Energy
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Guest	Brady	Nesvold	Xcel Energy
Guest	Nikolaus	Dillon	Dominion Energy
Member	George	Partyka	PTI Transformers
Guest	Nitesh	Patel	Hyundai Power Transformers USA
Guest	Pouneh	Davoudi	Delta Star Inc.
Guest	Ion	Radu	Hitachi ABB Power Grids
Guest	Duvier	Bedoya	Hitachi ABB Power Grids
Guest	David	Calitz	Siemens Energy
Guest	Sergio	Hernandez Cano	Hammond Power Solutions
Member	Moonhee	Lee	Hammond Power Solutions

Role	First Name	Last Name	Company
Guest	Joaquin	Martinez	Siemens Energy
Guest	Kyle	Stechschulte	American Electric Power
Guest	Shawn	Gossett	Ameren
Guest	Afshin	Rezaei-Zare	York University
Guest	Yaquan (Bill)	Li	BC Hydro
Guest	Megan	Eckroth	EATON Corporation
Guest	Duy	Vo	Central Maine Power (AVANGRID)
Guest	Albert	Sanchez	Knoxville Utilities Board
Guest	Vincenzo	Pagliuca	Hartford Steam Boiler
Guest	Dinu	Amarasinghe	Bruce Power

B.3.2 WG C57.113 - Recommended Practice for PD Testing,

Ali Naderian – Chair, Janusz Szczechowski – Vice Chair
John Foschia – Secretary
VIRTUAL MEETING | October 19th, 2020 | 10:10am – 11:35am ET

Chair: Ali Naderian
Vice Chair: Janusz Szczechowski
Secretary: John Foschia

Meeting Attendance
The working group met at 10:10am ET. There were 92 attendees and 15/38 members present. Quorum was not achieved to conduct official business.

Discussions

- No essential patent claims or copyright violations noted.
- Two separate polls were conducted in the online platform and confirmed a lack of quorum.
- The membership and participant lists were compared and confirmed a lack of quorum.
- The chair informed the working group of the recent passing of Dr. Jitka Fuhr and acknowledged her contributions to the field.
- It was noted that the current PAR expires December 2021.
    - Pending electronic approval of the WG, a 1 year PAR extension will be requested.
- It was noted noted that C57.124 has the same issues as C57.113 in that it is outdated and needs to be revised.
    - There was concern on whether the WG needs to approve the sharing of content between working groups. If so, the WG will seek electronic approval of the sharing of this content.
- There was commentary about a few of the items that should be modified within section 4 of the guide.
    - Programmable gain amplifier vs. attenuator
    - Time constant of 440 ms
    - Averaged pulse trains vs weighted
    - Calibration linearity when calibration signal is close to the noise floor.
    - Removal of Annex A
        - Raja K. disagreed with the removal of this Annex based on his experience.
    - Modifications to description of PD calibration equipment
    - Modifications to the scale factor language.
- Concern was brought up regarding the references to IEC 60270 because of copyright concerns and frustration of IEEE users not having access to an IEC document.
    - IEEE SA noted that we can extract 10% of the material without generating copyright issues.
    - Malia Zaman provided the following commentary:

        - If its normative and in the body of the standard then it should be extracted and copyright permission should be requested, but if its informative, then you can reference it.
        - Normative references are those documents that contain material that must be understood and used to implement the standard. Thus, normative references are indispensable when applying the standard. Each normative reference shall be cited in normative text and the role and relationship of each referenced document shall be explained in the body of the standard. If a reference is not specifically cited in the normative text of the document, then it shall not be listed in the normative references clause. In such cases, it shall be listed in the first or final informative annex, titled Bibliography [see item g) below]
        - If the standard is intended for international adoption, the working group should consider requirements for normative references by international organizations, such as the International Organization for Standardization (ISO) and the International Electrotechnical Commission (IEC). These requirements may include procedures for justification of normative references that are not international standards. Contact IEEE-SA content publishing staff for information about specific requirements.11:01
- The chair asked the WG about their opinions on using a standardized form of PD patterns.
    - It was noted that the patterns are not explicitly stated in the PAR and that the C57.113 guide may be better off speaking to the usefulness of PD patterns instead.
    - The SCDT chair noted that the reference PD patterns may be best placed in the C57.168 low frequency dielectric test guide which is currently being developed.
- The meeting was adjourned at 11:35am ET without a motion.

John Foschia

Attendance WG C57.113

Participant	Name
1	Evgenii Ermakov
2	Mihai Huzmezan
3	Bill Li
4	Hakan Sahin
5	t901ajf
6	Jeff Benach
7	D Gross
8	Muhammad Ali Masood Cheema

9	suresh babanna
10	Susan
11	Michael A. Franchek
12	Dwight Parkinson
13	John Reagan
14	Ali Naderian
15	Raja Kuppuswamy
16	Dinesh Sankarakurup
17	david.larochelle
18	Jeff Door
19	Deniss Villagran
20	Dave
21	Hossein Nabi-Bidhendi
22	mfg18
23	Alexander Winter
24	Alexander Winter
25	miman
26	Erich Buchgeher
27	Tom Melle
28	Ajith Varghese (SPX, Waukesha)
29	George Jr Partyka
30	John Foschia
31	John Herron
32	John Herron
33	J.Dennis Marlow
34	David Calitz (Guest)
35	Pragnesh Vyas
36	Dominique Bolliger
37	Kiran Vedante
38	William Boettger
39	Edmundo Arevalo
40	ANIL SAWANT
41	Wallace Binder
42	Marco Espindola
43	Feras Fattal
44	Bertrand Poulin
45	Sergio Hernandez Cano
46	akash joshi
47	cjp
48	Troy Tanaka
49	Deepak kumaria

50	Anastasia O'Malley
51	Jacques Vanier
52	Shiva Rampersad
53	Yves Vermette
54	Ramon Benedict
55	Kayland Adams
56	Brian Penny
57	Jaroslaw Chorzepa
58	Ross McTaggart
59	shamaun Hakim
60	Parminder
61	Zoltan Roman
62	Tammy Behrens
63	Dejan Vuković
64	Nik Dillon
65	Nick Kostich
66	Fernando Leal
67	Chris Baumgartner
68	Nitesh Patel
69	Nitesh Patel
70	Waldemar Ziomek
71	Waldemar Ziomek
72	Waldemar Ziomek
73	Rodrigo Ocon
74	David Murray
75	Wayne
76	Wayne
77	Wayne
78	Malia Zaman
79	Polo Rodriguez
80	DANIELA EMBER BACIU
81	Shawn Gossett
82	Kris Neild
83	Robert Ganser
84	Nabi Almeida
85	WILLIAM LARZELERE
86	USDUBED
87	Dharam Vir
88	Steve Jordan
89	Feras Fattal
90	bill griesacker

91	Evgenii Ermakov
92	Saramma Hoffman
93	Marcos Ferreira
94	Darrell Banks
95	Darrell Banks
96	Darrell Banks
97	Darrell Banks
98	Jeremiah Bradshaw
99	Gael R Kennedy
100	James McIver
101	Reto Fausch
102	Brady Nesvold
103	Joe Watson
104	David Murray
105	Kyle Stechschulte
106	Janusz Szczechowski
107	Janusz Szczechowski
108	Lee Tyler
109	Steve Brzoznowski
110	Steve Snyder
111	Anand Zanwar
112	Larry Dix
113	Dale
114	Doug McCullough
115	Peter Kleine
116	Eric Schleismann
117	Cihangir John
118	Derek Hollrah
119	Rod Sauls
120	Moonhee Lee
121	Don Dorris
122	Don Dorris
123	Balakrishnan
124	Balakrishnan
125	mark lachman
126	OAvanoma
127	janet
128	janet
129	janet
130	Danny Schwartz
131	Virtual Events PSAV

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F20 Update: WG C57.113 PD Measurement Guide

Quorum: Not achieved

MOM & Agenda: Will seek electronic approval

Highlights:

- No official business conducted in the absence of quorum.
- Further updates to section 4 and 5 of the guide were presented.
- Discussion was held regarding the frequent references to IEC 60270, users opinions, and copyright considerations.
- Potential for the removal of phase-resolved PD patterns to include in the new C57.168 (currently in development)

B.3.3 Working Group for Impulse Guide – PC57.98

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

VIRTUAL MEETING | October 19th, 2020 | 1:55pm - 3:10pm ET

Chair: Thang Hochanh

Vice Chair: Reto Fausch

Secretary: John Foschia

Meeting Attendance

The working group met at 1:55pm. There were 78 attendees and 11/33 members present. Quorum was not achieved to conduct official business.

Discussions

- No essential patent claims or copyright violations noted.
- Two separate polls were conducted in the online platform and confirmed a lack of quorum.
- The membership and participant lists were compared and confirmed a lack of quorum.
- The chair proposed text for two new subsections of the guide, specifically under section 4.1.2.1, 'The transformers' effect on the waveshape.' *(See attached)*
    - The two sections' proposed titles are as follows:
        - Test voltage factor procedure when performing chopped wave
        - Test voltage factor procedure and presentation of test results.
- The working group discussed the proposed text at length, yielding the following notes:
    1. The guide cannot specify requirements it can only reference standards and how to comply with the standards.
    2. Standard 4 recommends a level of overshoot of 5% and 10% if k-factor is used, but leaves it to the specific apparatus committees to determine limitations for their respective standards.
    3. The present version of C57.12.90 does mention overshoot handling for chopped waves (front or tail chopped).
    4. It was mentioned during the meeting, that in C57.12.90, any level of overshoot is allowed, provide that the front time does not exceed 2.5 microseconds.
    5. Most software does not display the value of the maximum value recorded during the test. The display voltage is only the corrected voltage when the k-factor function is enable. However, it is said that the peak voltage can be measured on the oscillogram.
- The chair of the SC for Dielectric Test asked if the distribution impulse guide could be included in C57.98. The WG chair agreed. No further discussion was held on the subject.
- The WG chair agreed to revise the text within the scope of a guide.

Adjournment

The meeting was adjourned at 3:10pm ET without a motion.

John Foschia

Attendance WG PC57.98

Participant	Name
1	Bill Li
2	Reto
3	Anand Zanwar
4	Ajith Varghese (SPX, Waukesha)
5	Mike Spurlock
6	Parminder
7	Leopoldo Rodriguez
8	Sam T. Reed
9	mark lachman
10	deepak kumaria
11	general session
12	general session
13	wziomek
14	Kyle Stechschulte
15	Ross McTaggart
16	Sergio Hernandez Cano
17	Joseph Tedesco
18	Edmundo Arevalo
19	Sylvain Plante
20	Kris Zibert
21	Steve Snyder
22	Pouneh Davoudi
23	Kiran Vedante
24	Kyle Heiden
25	Donald Ayers
26	Ryan Bishop
27	Shiva Rampersad
28	John K John
29	Jos Veens
30	Thang Hochanh
31	Jeffrey Schneider
32	Mike Spurlock
33	hossein
34	yang baitun
35	Chris Powell
36	Rod Sauls
37	Dominique Bolliger
38	Jeremy Johnson

39	Colby Lovins
40	J.Dennis Marlow
41	Darrell Banks
42	Megan Eckroth - Eaton
43	Dejan Vuković
44	Susan
45	Jim McBride
46	bill
47	Jorge Cruz
48	Bertrand Poulin
49	Curtiss Frazier (Ameren)
50	Danny Schwartz
51	DANIELA EMBER BACIU
52	Shawn Gossett
53	Shawn Gossett
54	Peter Kleine
55	HAKAN
56	John Foschia
57	Neil Strongosky
58	Neil Strongosky
59	pblaszczyk@transformercomponents.com
60	Mana Yazdani
61	Tim-Felix Mai
62	Juan Pablo Andrade Medina
63	Feras Fattal
64	Rodrigo Ocon
65	Justin PSAV
66	WILLIAM LARZELERE
67	XOSE M. LOPEZ-FERNANDEZ
68	Jacques Vanier
69	John Sinclair
70	Peter Balma
71	David Calitz (Guest)
72	David Wallach
73	Ken Klein
74	Mike
75	Jaroslaw Chorzepa
76	Kyle Heiden
77	ray54162
78	Feras Fattal
79	edavis

80	edavis
81	Pierre Riffon
82	USDUBED
83	Saramma Hoffman
84	Malia Zaman
85	Hemchandra Shertukde
86	Hemchandra Shertukde
87	Gael R Kennedy
88	chuckj
89	Mark Perkins
90	Jonathan Reimer
91	Rudolf Ogajanov
92	Fernando Leal
93	shamaun Hakim
94	susan bonfiglio
95	t901ajf
96	t901ajf
97	Michael A. Franchek
98	yvermette@hubbell.com
99	zweiss
100	Sam T. Reed
101	Alan Washburn
102	Mike Warntjes
103	Alexander Winter
104	Brandon Dent
105	ANIL SAWANT
106	Brian Sonnenberg
107	HV Sales

10/19/2020 Proposed Text - IEEE WG Revision of C57.98 Guide for Transformer Impulse Tests

4.1.2.1 The transformer effect on the waveshape

Remove "Large transformers …..… in IEEE Std 4".

4.1.2.1.1 Waveshape with overshoot (peak oscillations) and test voltage factor procedure

In IEEE Std-4-2013 clause 8.2.1.1 and Annex A, when an lightning impulse waveshape shows an relative overshoot ß', it is recommended to limit ß' to 10% for HV apparatus. In impulse testing for transformers and reactors, due to low winding inductance and/or high surge capacitance, it is recommended to proceed with the test when the test circuit is optimal and the test voltage procedure is enable. For test voltage factor procedure and chopped wave, see clause 4.2.2.1.

NOTE – In case of an high ß' value and an overshoot frequency above 500 kHz, the test voltage procedure reduce the test voltage value Vt significantly against the recorded peak value Ve. This may lead to higher electrical stress and possible breakdown of the insulation system.

For lightning impulse tests on transformers and reactors, a manual evaluation of the test function procedure is not reliable. A test laboratory who does not have the Test function procedure available, should inform the customer at the stage of quotation.

4.1.2.1.1 Test voltage factor procedure when performing chopped wave

In general, for liquid immersed transformers the chopped wave is 110% of the full wave, while in Dry-type transformers, the chopped wave is 100%. The test voltage procedure evaluation of a chopped wave of 110% of the wave, should give a peak value of 110% of the full wave.
When the test voltage procedure calculation of Vt is inconsistent, the following steps are recommended:

a) Front chopped wave lightning impulse:
   There is no correction and Vt is equal to Ve.
b) Tail chopped lightning impulse:
   Voltage reduction ratio Method (IEEE Std 4™ 2013, Annex A)
   - Apply a reduced full wave (RFW)
   - The test voltage procedure provide the test voltage Vt and the peak value Ve of the original recorded curve.
   - If Ve is not available, Ve can be determined graphically on the recorded oscillogram
   - Calculate the voltage reduction ratio Rv= Vt / Ve
   - Apply a full voltage chopped wave, having a recorded voltage V'e.
     The calculate V't is defined as:
     V't= Rv * V'e
c) The value of front time T1 of the reduced full wave (RFW) is used to determine the T1 value of the chopped wave.

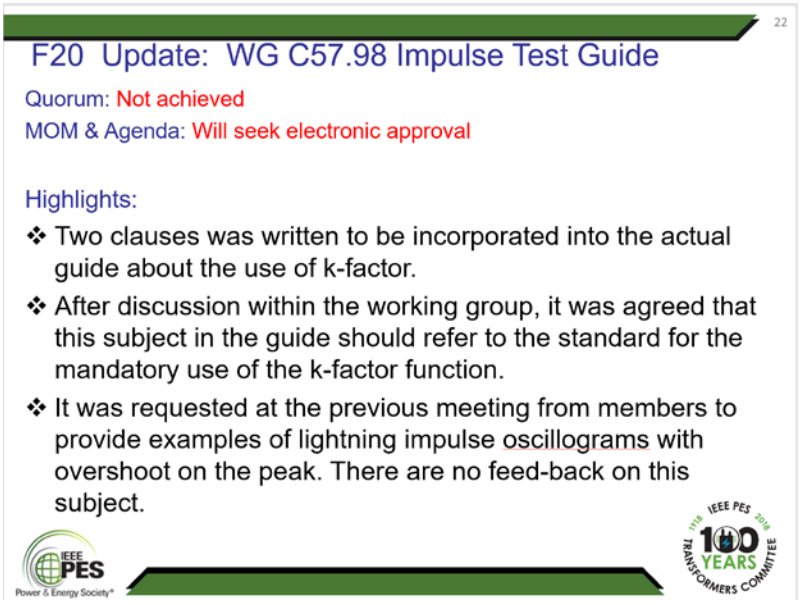
4.1.2.1.2 Test voltage factor procedure and presentation of test results

When the test voltage procedure is enable, the following test results should be displayed:

- Vt is the test voltage
- ß' is the relative overshoot magnitude

The following optional value should be available for display:

- Ve the peak value of the original noise free recorded curve.



B.3.4 Working Group for PD in bushings, PTs and CTs – PC57.160, WG Secretary: Reto Fausch; WG Chair: Thang Hochanh -Meeting Minutes:

VIRTUAL MEETING | October 20th, 2020 | 3:45pm - 5:00pm CT

Meeting Attendance

The working group met at 3:45pm.
There were 45 attendees, 16 members 22 Guests, 7 requested membership, 8 no answers to the survey.
Quorum was not achieved to conduct official business.

Discussions

- No essential patent claims or copyright violations noted.
- A large portion of the discussion was on PD Pattern samples to be included in the guide
  - Detlev Gross did some explanations on the patterns he graciously supplied to be included in the guide.
  - Raja Kuppuswamy wanted some more text for clarification purposes, so he will supply text and additional samples to be included.
  - Bruno Mansuy ask the question sample pattern “void in epoxy resin” may not exactly reflect what is seen on that sample.
- The ballot submitted had an approval rate of 84% (min. required is 75%). Due to a high number of comments, the chair had to respond to comments before submitting to the CRG.
- The WG chair mentionned that Pierre Riffon is not present but accepted to chair the CRG.

Quorum

- We had no quorum.

Additional contribution with samples (PRPD patterns) will come from :

- Raja Kuppuswamy
- Zoltan Roman

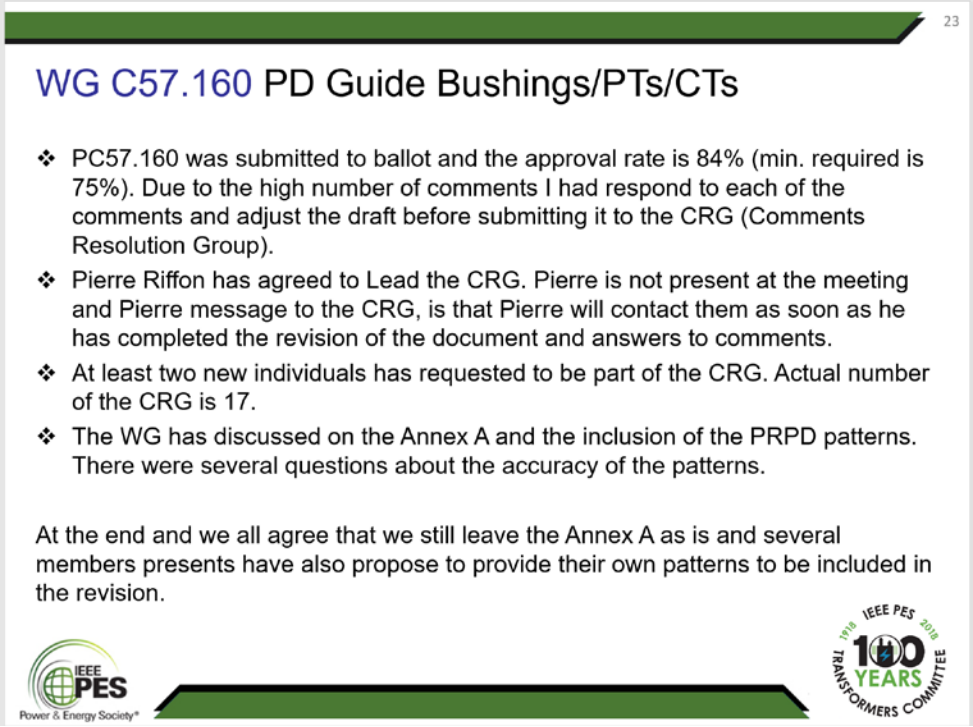
There are several members volunteering to be on the comments resolution group (CRG)

Detlev Gross
Dave Wallace
Bruno Mansuy
Ferras Fattal
Reto Fausch
Jonathan Deverick as English language editor
Deepak Kumaria, as English language editor

Adjournment

The meeting was adjourned at 4:55pm ET, without a motion.

Reto Fausch, Secretary PC 57.160



Attendance WG C57.160

this is imported from PSAV polling

Q1.What is your Membership Status?
Answers Results %
A Member 11/48 23
B Guest 22/48 46
C Guest Requesting Membership 7/48 15
No Answer 8/48 17

marked as Members but not on Member List

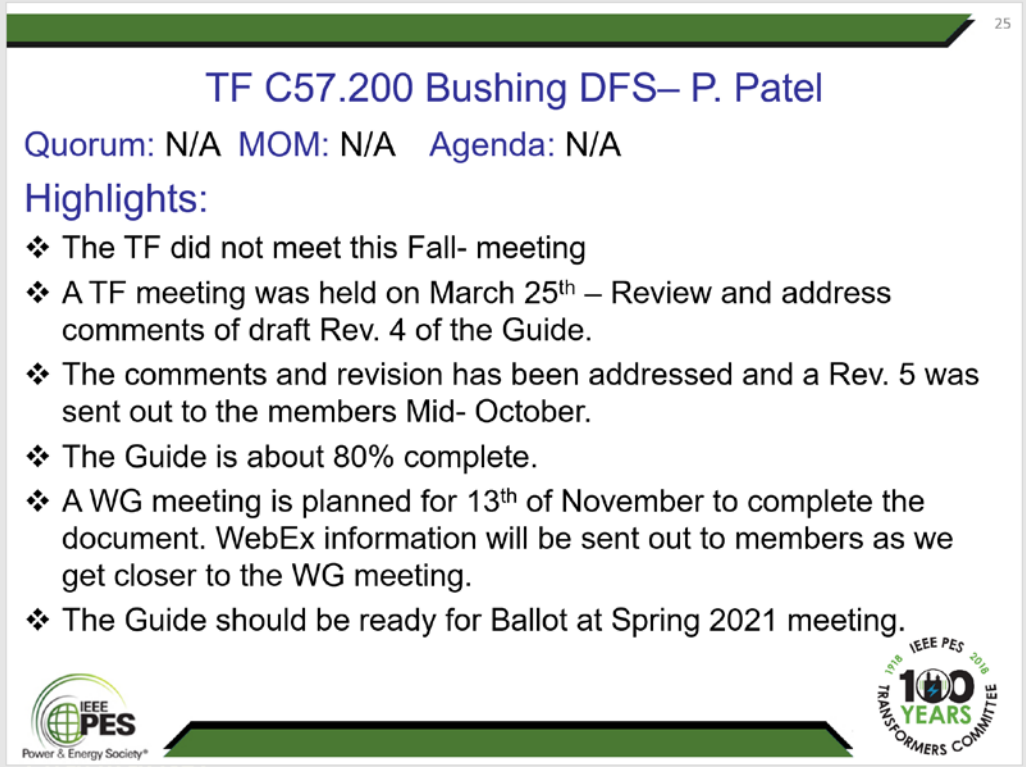
present from Memberlist

			Member	**Guest**	
First Name	Last Name	Company Name	**A**	**B**	**C**
hossein	|		X	|	|
Mubarak	abbas		|	X	|
Duvier	Bedoya		|	X	|
Lee	Bigham	Instrument Transformer Equip Corp		|	|
JD	Brafa,		|	X	|

Steve	Brzoznowski	Bonneville Power Administration		X	
Jonathan	Cheatham	General Electric	X		
Jaroslaw	Chorzepa			X	
HUAN	DINH			X	
Jeff	Door			X	
Wayne	Ellis				
DANIELA	EMBER	Hydro-Quebec IREQ		X	
Eric	Euvrard			X	
Feras	Fattal	Manitoba Hydro		X	
Reto	Fausch	RF Solutions			X
Marcos	Ferreira	Advisian-Worley Parsons			X
John	Foschia			X	
Shawn	Gossett			X	
Detlev	Gross	Power Diagnostix	X		
Thang	Hochanh	Surplec Inc.		X	
Derek	Hollrah			X	
Jeremy	Johnson				
Marek	Kornowski	Polycast International			
deepak	kumaria				X
Raja	Kuppuswamy	Dynamic Ratings, Inc.	X		
Fernando	Leal	Prolec GE		X	
Bruno	Mansuy	Trench France SAS		X	
Trevor	Mattson			X	
Ross	McTaggart	Trench Limited	X		
Bob	Middleton	RHM International	X		
Stephen	oakes	WEG Transformers USA Inc.	X		
Juan Jose	Ramirez Gamez		X		
Diego	Robalino	Megger		X	
general	session				
Thomas	Sizemore	ABB Inc.	X		
Steve	Snyder	Hitachi ABB Power Grids	X		
Janusz	Szczechowski	Maschinenfabrik Reinhausen			X
Jacques	Vanier	Electro Composites ULC		X	
Yves	Vermette	Electro Composites ULC		X	
David	Wallace	Mississippi State University	X		
Eric	Weatherbee	Knoxville Utilities Board	X		
Daniel	Weyer				X
Bill	Whitehead	Siemens Energy			X
Christopher	Whitten				
Roman	Zoltan		X		

B.3.5 Task Force for Bushing DFR – PC57.12.200, TF Secretary: Diego Robalino; TF Chair: Poorvi Patel; TF Vice Chair: Charles Sweetser

The TF did not have a virtual meeting this Fall 2020 meeting.
WG meeting is scheduled for 13th of November in China
Below are the highlights of the progress so far.
In Spring of 2021 the guide would be ready for balloting.



B.3.6 TF on Revision of Low-Frequency Tests

Virtual Meeting – October 20, 2020 1:55 p.m,
Chair: Bill Griesacker, Vice Chair: Daniel Blaydon (acting secretary), Secretary: Myron Bell.

1. The meeting was called to order at 1:56 PM.

2. A poll was conducted via Webex to determine whether a quorum was present. Based on the preliminary results, a quorum was achieved.

   Attending members were counted and quorum was verified by the Webex Report, which is provided in summary below:

Attendance

	Webex
Total Attendees	94
Total # Of Members	62
Members Present	39
Quorum Present	YES

3. The chair requested the working group to approve the the meeting agenda. There were no objections to unanimous approval of the agenda.

4. The chair requested the working group to approve the meeting minutes from the 2019 Fall Transformers Committee meeting held in Columbus, Ohio. There were no objections to unanimous approval of the meeting minutes.

5. Task Force on PD Testing of Class 1 Power Transformers report by Don Ayers (Appendix A – Meeting Minutes)

   Don provided a summary report on the Task Force meeting that occurred on Monday, October 19th. A quorum was achieved at the meeting. A motion was made that when PD testing is specified for Class I Power Transformers that this test should be conducted in accordance with the procedure and PD limits for Class II power transformers as defined in C57.12.00 and C57.12.90. The motion passed.

   Following this, a motion was made that PD measurements should only be taken on the terminals with the highest voltage rating. This motion passed.

6. Review of Survey Results for PD Limits in Factory Testing

   The chair reviewed the history of this survey and results. The chair inquired about the next steps for inclusion of the other revisions to this section of the test code besides the previously established PD limits. The chair opened the floor to

discussion and suggested the formation of an additional task force to address the additional proposals for PD factory testing.

A motion was made by Bertrand Poulin and seconded by Dan Sauer to "Form a study group for the further development of the Class II power transformer partial discharge testing procedure and limits". There was no objection to unanimous approval of the motion. These additional developments would be for the next revision of the C57.12.90 standard after the current revision is published.

7. Review of Survey Results for PD in Bushings During Transformer Factory Testing

   The chair reviewed the history of this survey and provided a detailed summary of the results and comments received. A discussion was held with various individuals providing feedback on their experience with venting bushings during factory testing. It was stated that factory testing conditions are different from service conditions since the voltage is higher during the induced voltage test. The chair will summarize the survey results and send to the task force.

   The chair noted that the meeting time had expired and that additional discussion will occur at the next meeting.

8. Old business

   None.

9. New business

   None.

10. The meeting was adjourned at 3:10pm.

****

F20 Update: TF Revision to Low Frequency Test

Quorum: Achieved MOM: Approved Agenda: Approved

- TF Class I PD Test – Looking to using Class II procedure and limits
  - Passed Motion: "When PD testing is specified for Class I Power Transformer, this test should be carried out as defined in C57.12.00-2015, and the PD limit shall be as stated in C57.12.90-2015."
- Factory PD Limits – Motion approved to form new Study Group
- PD in Bushings – Reviewed survey on proposed statement

B.3.7 Task Force Winding Insulation Power Factor & Winding Insulation Resistance Limits, Diego Robalino (Chair) and Aniruddha Narawane (Secretary) at the meeting

Minutes of Meeting held on 10.20.2020: Virtual Meeting via WebEx

1. Meeting was called to order at 8.00 am by Chairman Diego Robalino
2. Chairman checked for any patents and copy rights and there were none
3. There were 25 members present out of 41. Based on the attendance, quorum was established.
4. Agenda was approved Unanimously.
5. Minutes of Fall 2019 meetings were approved Unanimously.
6. Chairman presented the data slides containing data from about 148K samples received by IEEE.
7. Questions were asked about the data samples relative to type of fluid if the data was from transformers with mineral oil or it also contained alternate fluids. Chairman responded that majority of the data was based on mineral oil transformers with some from transformers with alternate fluids.
8. Mentioned that for Class-II transformers difference between FAT and Field test values is not significant.
9. It was asked if the data was only for FAT or contained both FAT and Field. Chairman responded that it contained both. Chairman also mentioned that the data provided to the group was filtered out based on the data temperature range being close to the recommended temp range per IEEE C 57.12.90 from the total 148K data points received.
10. Chairman mentioned it is time to discuss if the group would like to discuss about accepting the data to submit it to subcommittee.
11. There was discussion about PF testing data provided by manufacturers at test temperature v/s the standard temperature. It was discussed that in absence of accurate conversion techniques for temperature it would be better to provide the test data and the temperature at which test was carried out as long as the test is carried out at a temperature which is in the range specified by IEEE C57.12.90.
12. Mr. Kumar Mani Moved the motion to “Accept the data presented and submit it to the Dielectric Tests Subcommittee” The motion was voted and carried with 30 voting for, 1 against and 7 Abstaining.
13. Chairman mentioned that between this and Spring 2021 meeting a report will be formulated to be submitted to subcommittee and requested for volunteers. Mario Locamo, Don Dorris, Lorne Gara, Zan Kiparizoski, Davis Wallach Volunteered. Chairman mentioned to communicate with himself or the secretary Aniruddha Narawane if more members/guests are interested to participate in formulating the report.
14. During the discussion, the issue of temperature influence on the data presented called for use of the additional data and show average variation of PF values by temperature and to collect this information into a paper to be published for general information of the industry.
15. Meeting was adjourned at 9.14 am.
16.

Annex A: attendance from PSAV report
Taking into account several duplicates (in/out/in) probably due to internet connection issues and taking away those attending less than 15 min, the total number of attendees to this meeting based on PSAV report is 96.

Annex B:
Quorum established. As reported by PSAV at the beginning of the meeting, out of 77 responding to the question, 25 were members attending the meeting. Total members in this TF is 41. Therefore, quorum was established with 61% attendance of TF members.

A.Member	25/77 (32%)
B.Guest	39/77 (51%)
C.Guest Requesting Membership	10/77 (13%)

Annex C: Relevant chat recorded during the meeting

from Timothy Raymond to everyone:	If the intent is to place a limit on _factory_ test values for insulation power factor, I think that is inappropriate. The are more appropriate factory acceptance tests for verifying insulation integrity. I don't see the added value or appropriateness in adding a limit. I understand that's a follow on discussion.
from David Wallach to everyone:	I personally like a presentation of histograms from a large database in a guide, with no limit, to let users decide what is limiting and also for evaluation during future maintenance.
from David Wallach to everyone:	We've collected data and created a method to store data with IEEE-SA which is HUGE.
from Don Dorris to everyone:	I studied our own Class II transformers for the past 50 years. From our data and the data I saw you could easily establish pf guidelines. Core, shell, auto etc..,
from Poorvi Patel to everyone:	Thanks Diego... good source of data for further analysis

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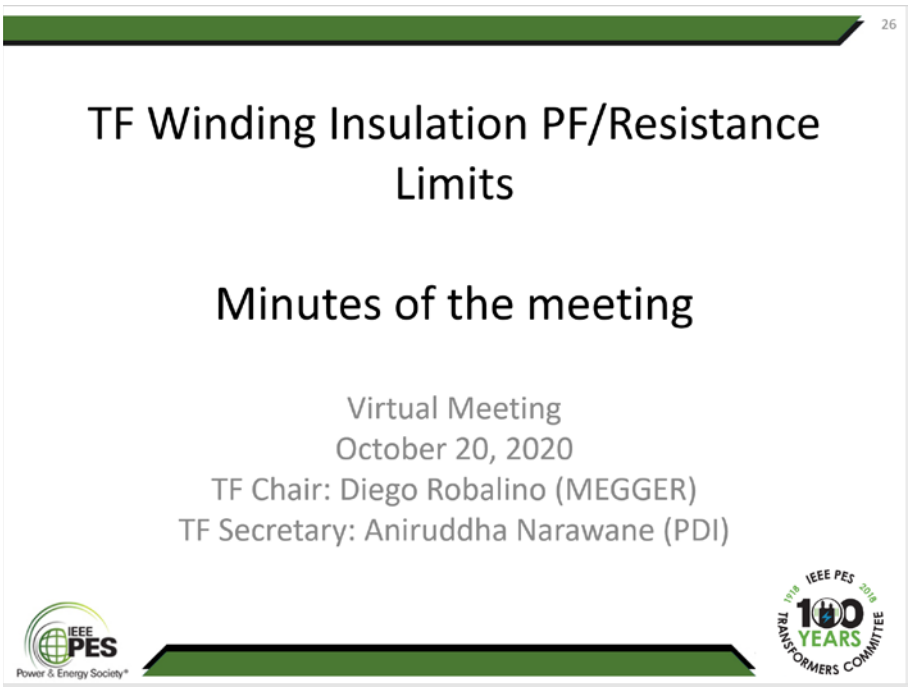

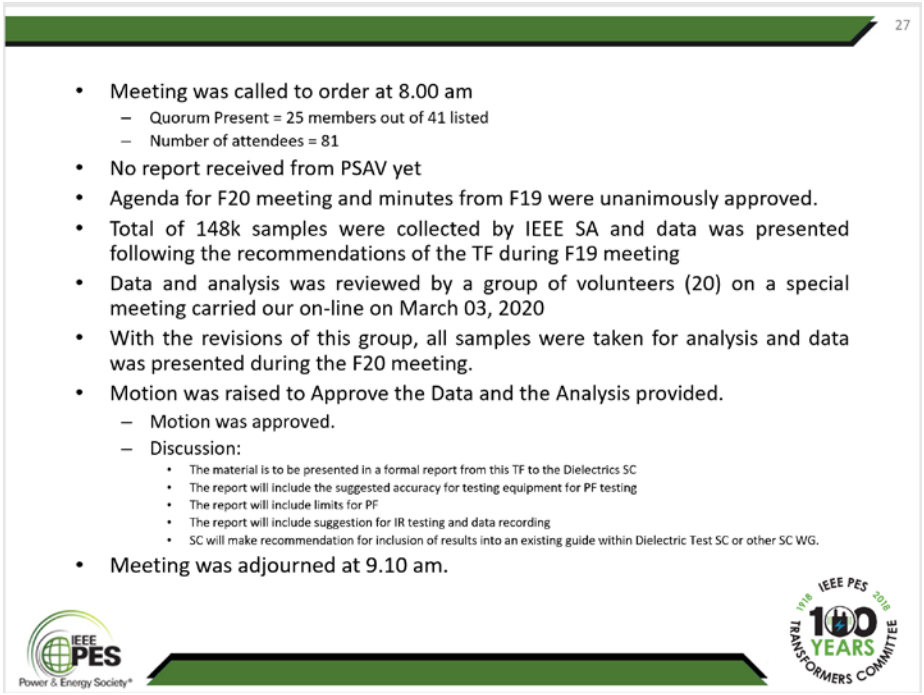

Attendance TF Winding Insulation Power Factor & Winding Insulation Resistance Limits

Participant	Name
1	George Frimpong
2	Erich Buchgeher
3	Erich Buchgeher

4	Attila Gyore
5	Attila Gyore
6	Larry Christodoulou
7	ANIL SAWANT
8	Darrell Mangubat
9	Devki Sharma
10	Subhas Sarkar
11	Subhas Sarkar
12	Muhammad Ali Masood Cheema
13	Shiva Rampersad
14	Dinu Amarasinghe
15	Dinu Amarasinghe
16	Tony Reiss
17	Raj Ahuja
18	Cornelius Plath
19	Brady Nesvold
20	Rhea Montpool
21	Dejan Vuković
22	Drew Welton
23	general session
24	Jonathan Sinclair
25	Roger Hayes
26	Tim Rocque
27	DANIELA EMBER BACIU
28	John Lackey
29	David Wallach
30	Anthony Natale
31	Avijit Shingari
32	Zan Kiparizoski
33	Aniruddha Narawane
34	XOSE M. LOPEZ-FERNANDEZ
35	Alan Washburn
36	Zack Draper
37	Luiz Cheim
38	Anastasia O'Malley
39	Cihangir John
40	Donald Ayers
41	Guner Ismail
42	Guner Ismail
43	Guner Ismail
44	Jim Graham

45	Mario Locarno
46	Timothy Raymond
47	Donald Lamontagne
48	Derek Hollrah
49	Ali Naderian
50	Alan Sbravati
51	Zan Kiparizoski
52	Steve Jordan
53	Anand Zanwar
54	Kris Zibert
55	Poorvi Patel
56	Susan
57	Nitesh Patel
58	Samragni Dutta Roy
59	Marco Espindola
60	Virtual Events PSAV
61	Egon Kirchenmayer
62	Egon Kirchenmayer
63	Parminder
64	Aleksandr Levin
65	vbaniroula
66	vbaniroula
67	Waldemar Ziomek
68	KUMAR
69	KUMAR
70	Wayne Ellis
71	Gary Hoffman
72	David Calitz (Guest)
73	Rob Shepherd
74	Charles Sweetser
75	Daniel Sauer
76	Jeffrey Schneider
77	Muhammad Ali Masood Cheema
78	Rodrigo Ocon
79	Fernando Saldivar
80	Zachery Weiss
81	Kris Neild
82	JS
83	Oleg Roizman
84	Ajith Varghese (SPX, Waukesha)

85	Lorne Gara
86	Kevin Biggie (Weidmann)
87	Diego Robalino
88	Diego Robalino
89	Stephanie Denzer
90	OAvanoma
91	Jorge Cruz
92	Peter Werelius
93	Roger Hayes
94	Don Dorris
95	Saramma Hoffman
96	Saramma Hoffman
97	Kyle Zemanovic
98	Pragnesh Vyas
99	David Murray
100	kushal singh
101	Lee Matthews
102	William Boettger
103	Eric Doak
104	Marc Foata
105	Fernando Leal
106	Kevin C. Sullivan
107	Kevin C. Sullivan
108	Martín Muñoz
109	Michael A. Franchek
110	Mike Waldrop
111	Michael A. Franchek
112	Ryan Bishop
113	Nik Dillon
114	Stuart Chambers
115	Jonathan Reimer
116	Evgenii Ermakov
117	Philip Miller
118	Kayland Adams
119	Kayland Adams
120	Bruce Webb
121	Joe Nims
122	David Holland
123	Kyle Heiden
124	Mickel Saad
125	Megan Eckroth

126	Balakrishnan Mani
127	Balakrishnan Mani
128	Balakrishnan

B.3.8 Task Force Transient Failure Mitigation (WG PC57.142), Jim McBride (Chair), Xose Lopez-Fernandez (Vice Chair) and Tom Melle (Secretary)

Minutes of Meeting held on 10.20.2020: Virtual Meeting via WebEx 2.30-3.35 PM Central Time

Meeting called to order at 2:25 PM Central Time. Welcome and Chair's Remarks

2) Attendance Poll was taken at 2:30 PM. 104 Attendees were present (66 Guests) 38 of 69 Members present (quorum was achieved)

3) IEEE Patent Policy Slides (no essential patent claims made)

4) Approval of Agenda without objection. Approval of Spring 2020 Meeting Minutes without objection (motion to approve by Phil Hopkinson / 2nd by Rogerio Verdolin).

5) Switchgear Liason Task Force Update – Dave Caverly, Jim McBride The WG continues to receive excellent comments since Draft 6 from Switchgear experts via the Switchgear Liason TF. Draft 8 was created to address many of the ongoing comments. The SC task force met on October 6, 2020 and reviewed changes made in D8. Additional comments have been received after the October 6th meeting which lead to Draft 8B (now circulated). The presentation and the minutes from the SLTF meetings will be posted on the WG website.

6) Status of present work (D8B) and comments – Jim McBride

It was noted the IEEE Transactions Paper developed by members of the C57.142 WG has been published and is now available on the IEEE website.

Most of the revision to the Guide is completed. However, the WG plans to file for a PAR extension, in the event the work is not completed by the end of 2021.

Draft 8B includes and address several additional comments from the Switchgear Committee. It is posted on the Transformers Committee website.

Poll Questions:

Poll Question #1 (Changes to Section 6.4 Interruption with repetitive re-ignition)

The chair reviewed comments by Dr. Edgar Dullni (Switchgear Committee). Amplification of internal transformer resonance was discussed, along with series/parallel considerations and impedances within the circuit. A motion was made by Phil Hopkinson to continue to study the data and review ABB Bland test protocol data (second by Mike Spurlock). The motion carried with 37/69 member votes. These topics will remain under discussion and other new comments will be reviewed at the next meeting.

Poll Question #2 (Delete Clause 6.6 Transformer internal voltage response)

The Chair asked if Section 6.6 remains necessary, after the addition of 6.5 and modification of other clauses. Discussion ensued whether to delete or keep Section 6.6.

A motion was made by Phil Hopkinson to keep as much of Section 6.6 as possible and continue to review and modify as necessary (second by Hemchandra Shertukde). The motion carried with 37/69 member votes.

Poll Question #3 (Change to Section 7.2 Other mitigation methods) Discussion ensued on whether to replace last paragraph of Clause 7.2 with new verbiage from Edgar Dullni. It was noted that along with prior contributions by Juliano Montanha (Siemens) and Pierre Riffon, additional mitigation methods are being discussed for inclusion in section 7.2 based on the submitted comments. Phil Hopkinson made a motion to accept the existing mitigation methods paragraph and add any new methods resulting from the meeting and future input (second by Vijay Tendulkar). The motion had no objections (*note: only 31/69 members approved in the 1 minute poll).

Poll Question #4 (Changes to Example A1) Prior to the meeting Pierre Riffon, suggested the analysis should rather refer to the clauses in the main text rather than re-describing the phenomenon . Therefore Example A1 needs a revision. Further discussion was tabled until the next meeting.

Polling question #5 (changes to example A5) It was suggested that Example A5 is not consistent and should be revised. With disconnector switching, only the steepness of the breakdowns and the high number of breakdowns is decisive. Transformer resonances do not play a role. More information was solicited from the group and further discussion was tabled to the next meeting.

7) The mitigation methods task force had an update from Phil Hopkinson, but time ran out for a presentation. Motion was made by the chair to put Phil's presentation on the WG webpage without objection. The WG meeting slides and task force presentation have both been posted to the Transformers Committee webpage

8) New Business: none

9) Next Meeting: (Spring 2021 – Toronto, Ontario CA April 25-29)

10) Motion to Adjourn made by Hemchandra Shertukde (second by Phil Hopkinson). Meeting was adjourned at 3:35 PM without objection

Respectfully, Thomas R. Melle Secretary

Attendance

Role	First Name	Last Name	Company
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	Barry	Beaster	H-J Enterprises, Inc.
Member	Michael	Sharp	Trench Limited
Member	Steven	Snyder	Hitachi ABB Power Grids

Role	First Name	Last Name	Company
Member	Subhas	Sarkar	Virginia Transformer Corp.
Member	Bertrand	Poulin	Hitachi ABB Power Grids
Guest	Ed	teNyenhuis	Hitachi ABB Power Grids
Guest	Stephen	Jordan	Tennessee Valley Authority
Guest	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Loren	Wagenaar	WagenTrans Consulting
Guest	Donald	Ayers	Ayers Transformer Consulting
Guest	Dieter	Wagner	Hydro One
Guest	Jeffrey	Ray	JLR Consulting, Inc.
Member	Philip	Hopkinson	HVOLT Inc.
Guest	John	Crouse	Roswell Alliance
Guest	Axel	Kraemer	Maschinenfabrik Reinhausen
Guest	Christopher	Baumgartner	We Energies
Member	Enrique	Betancourt	Prolec GE
Guest	Christoph	Ploetner	Hitachi ABB Power Grids
Guest	Peter	Zhao	Hydro One
Guest	Michael	Haas	Instrument Transformers, LLC
Guest	Charles	Johnson	Hitachi ABB Power Grids
Member	Klaus	Pointner	Trench Austria GmbH
Guest	Robert	Ganser	Transformer Consulting Services, Co.
Member	Waldemar	Ziomek	PTI Transformers
Guest	Kumar	Mani	Duke Energy
Member	Vinay	Mehrotra	SPX Transformer Solutions, Inc.
Member	Rogerio	Verdolin	Verdolin Solutions Inc.
Guest	Norman	Field	Teshmont Consultants LP
Member	Hemchandra	Shertukde	University of Hartford
Member	Ross	McTaggart	Trench Limited
Guest	Dwight	Parkinson	EATON Corporation
Guest	Shibao	Zhang	PCORE Electric
Guest	Neil	Strongosky	Memphis Light, Gas & Water
Member	Mike	Spurlock	Consultant
Chair	James	McBride	JMX Services, Inc.
Member	Dharam	Vir	SPX Transformer Solutions, Inc.
Member	Kiran	Vedante	Ritz Instrument Transformers
Guest	Rodrigo	Ocon	Industrias IEM
Member	Vijay	Tendulkar	Power Distribution, Inc. (PDI)
Vice-Chair	Xose	Lopez-Fernandez	Universidade de Vigo
Guest	Daniel	Sauer	EATON Corporation
Guest	Ajith	Varghese	SPX Transformer Solutions, Inc.

Role	First Name	Last Name	Company
Guest	Anthony	Natale	HICO America
Member	Baitun	Yang	R.E. Uptegraff
Member	Huan	Dinh	Hitachi ABB Power Grids
Member	Thomas	Sizemore	ABB Inc.
Guest	Jeffrey	Schneider	EATON Corporation
Guest	Jos	Veens	SMIT Transformatoren B.V.
Member	David	Caverly	Trench Limited
Guest	Roderick	Sauls	Southern Company Services
Guest	Egon	Kirchenmayer	Siemens Energy
Guest	Leopoldo	Rodriguez	Transformer Testing Services LLC
Member	Sukhdev	Walia	New Energy Power Co.
Secretary	Thomas	Melle	HIGHVOLT
Guest	Kevin	Sullivan	Duke Energy
Member	Weijun	Li	Braintree Electric Light Dept.
Member	John	John	Virginia Transformer Corp.
Member	Aniruddha	Narawane	Power Distribution, Inc. (PDI)
Guest	Kenneth	Harden	Schneider Electric
Guest	Patrick	Rock	American Transmission Co.
Guest	Jason	Varnell	Doble Engineering Co.
Guest	Lorne	Gara	Shermco
Guest	Michael	Frayne	Hammond Power Solutions
Guest	Andre	Rottenbacher	Ritz Instrument Transformers
Guest	Yves	Vermette	Electro Composites ULC
Guest	Kris	Zibert	Allgeier, Martin and Associates
Guest	Tim-Felix	Mai	Siemens Energy
Member	Shankar	Subramany	KEMA Labs
Guest	Feras	Fattal	Manitoba Hydro
Guest	Peter	Kleine	US Army Corps of Engineers
Member	Akash	Joshi	Black & Veatch
Guest	Malia	Zaman	IEEE
Guest	John	Foschia	SPX Transformer Solutions, Inc.
Member	Cihangir	Sen	Duke Energy
Guest	Zachery	Weiss	WEG Transformers USA Inc.
Member	Deepak	Kumaria	Hitachi ABB Power Grids
Member	Israel	Barrientos	Prolec GE
Guest	Caroline	Peterson	Xcel Energy
Guest	Joseph	Tedesco	Hitachi ABB Power Grids
Member	Kyle	Heiden	EATON Corporation
Guest	David	Calitz	Siemens Energy
Member	Sergio	Hernandez Cano	Hammond Power Solutions

Role	First Name	Last Name	Company
Member	Colby	Lovins	Federal Pacific Transformer
Guest	Brian	Sonnenberg	Instrument Transformers, LLC
Member	Moonhee	Lee	Hammond Power Solutions
Guest	Sylvain	Plante	Hydro-Quebec
Guest	Mana	Yazdani	Trench Limited
Guest	Kyle	Stechschulte	American Electric Power
Member	Afshin	Rezaei-Zare	York University
Guest	Eric	Doak	D4EnergySolutions LLC
Guest	Megan	Eckroth	EATON Corporation
Guest	Raymond	Frazier	Ameren
Guest	Alan	Washburn	Burns & McDonnell
Guest	Kayland	Adams	SPX Transformer Solutions, Inc.
Guest	Drazena	Brocilo	Google
Guest	Nicholas	Podany	Bureau of Reclamation
Guest	Adam	Smith	Commonwealth Associates, Inc.
Guest	Darrell	Banks	Memphis Light, Gas & Water
Guest	Jacques	Vanier	Electro Composites (2008) ULC
Guest	Angela	Amador	EATON Corporation
Guest	Nicholas	Walder	EATON Corporation
Guest	Dinu	Amarasinghe	Bruce Power

B.4 Liaison Reports

IEEE High-Voltage Testing Techniques Subcommittee
Liaison Report to Dielectric Tests Subcommittee of IEEE Transformers Committee
Submitted by Jeff Britton (HVTT Subcommittee Chair)
Virtual Meeting 21st of October 2020.

- The HVTT Subcommittee and its active working groups met virtually during the week of September 28th, 2020

Active Projects Include

- IEEE P1122 – Impulse Digitizer Standard. Draft 6 in development, revision nearly complete. PAR extended to 2022. Expected to go to Ballot in early 2021. – Chair: Jeff Britton, Phenix Technologies, Inc.
- IEEE P510 – High Voltage Safety Guide. Draft 4 in development. PAR extension to 2022 requested. Expected to go to Ballot in mid 2021 – Chair: Jeff Hildreth, Bonneville Power Administration.
- IEEE P2426 – Field Measurement of Fast Front and Very Fast Front Overvoltages in Electric Power Systems (Entity PAR). Draft 5.5 in development. PAR expires end of 2021. Expected to go to Ballot in early 2021. – Chair: Shijin Xie, State Grid Corporation China.

- WG P454 – “Guide for the Detection, Measurement and Interpretation of Partial Discharges”. Draft 1 in development. PAR expires end of 2023. – Chair: Detlev Gross, Power Diagnostix.
- WG P4.1 – “Guide for the Practical Implementation of IEEE Std 4 on High-Voltage and High-Current Measurement Systems”. Draft 1 in development. Chair: Bill Larzelere, Evergreen High Voltage.
- IEEE Std. 4 Revision to begin in 2021 – Target Date: End of 2023

Next HVTT Meetings

- Scheduled during week of January 10th, 2021 - During virtual IEEE PES Joint Technical Committee Meeting (JTCM 2021).
- Contact Jeff Britton (jeff@phenixtech.com) or Jim McBride (jim@jmxhv.com) to participate, or join the PSIM Committee 123SignUp database at: https://www.123signup.com/mailinglist?Org=ieee-psim

B.5 Old/ Unfinished Business

Addition of STLI (**S**pecial **T**ermination **L**ightning **I**mpulse) to standard

- Parked till (Part of WG C57.142) TF on Risk mitigation on Transient failures presents their recommendation to DTSC

The WG is working on this. Phil has a presentation that is posted in Performance Characteristic Subcommittee site. It could be a few more meetings before it will come to the DTSC for the Impulse part.

B.6 New Business

C57.138 Recommended guide for Impulse Testing (Distribution transformers) – Standard valid 2026

The guide expires in 2026. The Chair raised a question if a PAR is needed to start a WG to start working on a revision. One opportunity is to adapt/incorporate requirement into C57.98- Impulse guide for power transformers.

There was discussion that Distribution Impulse testing is different compared to power transformer and it should be kept as either separate guide or incorporated into C57.98.

C57.98 is very good document for any kind of transformers. However, C57.138 is a good guide for higher volume transformers and therefore in some way be retained.

The Chair will reach out to the Distribution Transformer subcommittee to get their feedback and this topic will be discussed and decided on in the next DTSC meeting.

B.7 Adjournment

Meeting adjourned 12.20 PM.

Minutes respectfully submitted by:
Poorvi Patel
Secretary DTSC.

Attendance DTSC

Role	First Name	Last Name	Company
Member	Gregory	Anderson	GW Anderson & Associates, Inc.
Guest	Susan	McNelly	Xcel Energy
Guest	Dennis	Marlow	DenMar TDS Transformers
Member	Bruce	Forsyth	Bruce Forsyth and Associates LLC
Guest	James	Gardner	SPX Transformer Solutions, Inc.

Role	First Name	Last Name	Company
Guest	Bipin	Patel	Consultant
Member	William	Boettger	Boettger Transformer Consulting LLC
Guest	Timothy	Raymond	Electric Power Research Institute (EPRI)
Member	Bill	Griesacker	Duquesne Light Co.
Member	Joseph	Foldi	Foldi & Associates, Inc.
Member	Juan	Castellanos	Prolec GE
Guest	Mark	Perkins	D4EnergySolutions LLC
Member	Javier	Arteaga	ABB Enterprise Software Inc
Member	Steven	Snyder	Hitachi ABB Power Grids
Guest	Raj	Ahuja	Raj Ahuja Consulting
Guest	Dinesh	Sankarakurup	Duke Energy
Guest	Mahesh	Sampat	EMS Consulting Inc.
Member	Bertrand	Poulin	Hitachi ABB Power Grids
Member	Stephen	Jordan	Tennessee Valley Authority
Member	Emilio	Morales-Cruz	Qualitrol Company LLC
Guest	John	Lackey	PowerNex Associates Inc.
Guest	John	Lackey	PowerNex Associates Inc.
Member	Stephen	Antosz	Stephen Antosz & Associates, Inc
Guest	Loren	Wagenaar	WagenTrans Consulting
Member	Donald	Ayers	Ayers Transformer Consulting
Member	Dieter	Wagner	Hydro One
Guest	Dieter	Wagner	Hydro One
Guest	Dieter	Wagner	Hydro One
Guest	May	Wang	BC Hydro
Guest	Ali	Ghafourian	H-J Enterprises, Inc.
Guest	Ali	Ghafourian	H-J Enterprises, Inc.
Guest	Wallace	Binder	WBBinder Consultant
Member	Wallace	Binder	WBBinder Consultant
Member	Philip	Hopkinson	HVOLT Inc.
Guest	Paul	Jarman	University of Manchester
Member	Sheldon	Kennedy	Niagara Transformer
Guest	John	Crouse	Roswell Alliance
Member	Michael	Franchek	Retired
Member	Christopher	Baumgartner	We Energies
Member	Enrique	Betancourt	Prolec GE
Member	Enrique	Betancourt	Prolec GE
Guest	Christoph	Ploetner	Hitachi ABB Power Grids
Guest	Alain	Bolliger	HV TECHNOLOGIES, Inc.
Guest	Richard	Marek	Retired
Member	Peter	Zhao	Hydro One

Role	First Name	Last Name	Company
Guest	Gael	Kennedy	GR Kennedy & Associates LLC
Member	Ewald	Schweiger	Siemens Energy
Member	Reto	Fausch	RF Solutions
Member	Klaus	Pointner	Trench Austria GmbH
Member	Pierre	Riffon	Pierre Riffon Consultant Inc.
Guest	Robert	Ganser	Transformer Consulting Services, Co.
Vice-Chair	Thang	Hochanh	Surplec Inc.
Guest	Waldemar	Ziomek	PTI Transformers
Guest	Kumar	Mani	Duke Energy
Member	Vinay	Mehrotra	SPX Transformer Solutions, Inc.
Member	Eric	Davis	Burns & McDonnell
Member	Rogerio	Verdolin	Verdolin Solutions Inc.
Member	Hemchandra	Shertukde	University of Hartford
Guest	Scott	Reed	MVA
Guest	James	Mciver	Siemens Energy
Member	James	Mciver	Siemens Energy
Member	Don	Dorris	Nashville Electric Service
Member	Dwight	Parkinson	EATON Corporation
Guest	Jean-Noel	Berube	Rugged Monitoring Inc.
Guest	Scott	Digby	Duke Energy
Member	J. Arturo	Del Rio	Siemens Energy
Guest	Stephen	Shull	BBC Electrical Services, Inc.
Member	Ulf	Radbrandt	Hitachi ABB Power Grids
Member	James	Graham	Weidmann Electrical Technology
Member	Roger	Hayes	General Electric
Member	Marcos	Ferreira	Advisian-Worley Parsons
Member	Mike	Spurlock	Consultant
Member	James	McBride	JMX Services, Inc.
Member	Dharam	Vir	SPX Transformer Solutions, Inc.
Member	George	Frimpong	Hitachi ABB Power Grids
Guest	Rudolf	Ogajanov	ABB Inc.
Guest	Donald	Lamontagne	Arizona Public Service Co.
Member	John	Herron	Raytech USA
Member	Peter	Werelius	Megger
Guest	Rodrigo	Ocon	Industrias IEM
Guest	Marco	Espindola	ABB Enterprise Software Inc.
Guest	Marco	Espindola	ABB Enterprise Software Inc.
Guest	Hakan	Sahin	Independent
Member	Vijay	Tendulkar	Power Distribution, Inc. (PDI)
Member	Eric	Weatherbee	PCORE Electric

Role	First Name	Last Name	Company
Member	Brian	Penny	American Transmission Co.
Guest	Shamaun	Hakim	WEG Transformers USA Inc.
Guest	Zan	Kiparizoski	Howard Industries
Guest	Jose	Gamboa	H-J Family of Companies
Secretary	Poorvi	Patel	Electric Power Research Institute (EPRI)
Guest	Juan Carlos	Cruz Valdes	Prolec GE
Member	Daniel	Blaydon	Baltimore Gas & Electric
Guest	Xose	Lopez-Fernandez	Universidade de Vigo
Member	Daniel	Sauer	EATON Corporation
Guest	Aleksandr	Levin	Weidmann Electrical Technology
Chair	Ajith	Varghese	SPX Transformer Solutions, Inc.
Member	Baitun	Yang	R.E. Uptegraff
Member	Huan	Dinh	Hitachi ABB Power Grids
Member	Mario	Locarno	Doble Engineering Co.
Member	Troy	Tanaka	Burns & McDonnell
Member	Krishnamurthy	Vijayan	PTI Transformers
	Ali	Naderian	Metsco
Member	Ali	Naderian	Metsco
Guest	Ryan	Musgrove	Oklahoma Gas & Electric
Guest	Shankar	Nambi	Bechtel
Guest	Zoltan	Roman	GE Grid Solutions
Guest	Darren	Brown	Howard Industries
Member	Diego	Robalino	Megger
Guest	Jos	Veens	SMIT Transformatoren B.V.
Guest	Roderick	Sauls	Southern Company Services
Guest	Parminder	Panesar	Virginia Transformer Corp.
Member	Egon	Kirchenmayer	Siemens Energy
Guest	Leopoldo	Rodriguez	Transformer Testing Services LLC
Guest	Saurahb	Ghosh	Transformers & Rectifiers (India) Ltd
Member	Saurahb	Ghosh	Transformers & Rectifiers (India) Ltd
Member	David	Wallace	Mississippi State University
Member	David	Murray	Tennessee Valley Authority
Member	Sukhdev	Walia	New Energy Power Co.
Member	Thomas	Melle	HIGHVOLT
Guest	Stephen	Oakes	WEG Transformers USA Inc.
Guest	John	Poelma	NRG Energy
Guest	Fernando	Leal	Prolec GE
Guest	Kevin	Sullivan	Duke Energy
Member	Weijun	Li	Braintree Electric Light Dept.

Role	First Name	Last Name	Company
Member	John	John	Virginia Transformer Corp.
Guest	Ronald	Hernandez	Doble Engineering Co.
Member	Aniruddha	Narawane	Power Distribution, Inc. (PDI)
Guest	Steven	Brzoznowski	Bonneville Power Administration
Member	Babanna	Suresh	Southwest Electric Co.
Guest	Kenneth	Harden	Schneider Electric
Guest	Anil	Sawant	Virginia Transformer Corp.
Member	Detlev	Gross	Power Diagnostix
Member	Jarrod	Prince	ERMCO
Guest	Mats	Bernesjo	Hitachi ABB Power Grids
Guest	Marc	Taylor	Cogent Power Inc.
Member	David	Larochelle	NDB Technologies
Guest	Deanna	Woods	Alliant Energy
Member	Kurt	Kaineder	Siemens Energy
Guest	Erich	Buchgeher	Siemens Energy
Member	Markus	Schiessl	SGB
Guest	Christopher	Slattery	FirstEnergy Corp.
Guest	Kristopher	Neild	Megger
Member	Jason	Varnell	Doble Engineering Co.
Guest	Jonathan	Reimer	FortisBC
Guest	Lorne	Gara	Shermco
Guest	Ismail	Guner	Hydro-Quebec
Guest	Jeffrey	Wright	Duquesne Light Co.
Member	Anthony	Franchitti	PECO Energy Company
Member	Peter	Sheridan	SGB USA, Inc.
Member	Kris	Zibert	Allgeier, Martin and Associates
Member	Tim-Felix	Mai	Siemens Energy
Guest	Attila	Gyore	M&I Materials Ltd
Member	Jorge	Cruz	PTI Transformers
Member	Dr. Alexander	Winter	HIGHVOLT Pruftechnik Dresden
Guest	Edward	Casserly	Ergon, Inc.
Guest	Jeremiah	Bradshaw	Bureau of Reclamation
Guest	William	Whitehead	Siemens Energy
Guest	Anastasia	O'Malley	Consolidated Edison Co. of NY
Member	Florin	Faur	SPX Transformer Solutions, Inc.
Guest	Sanket	Bolar	Megger
Guest	Daniela	Ember Baciu	Hydro-Quebec IREQ
Guest	Feras	Fattal	Manitoba Hydro
Member	Dominique	Bolliger, Ph.D.	HV TECHNOLOGIES, Inc.
Guest	Peter	Kleine	US Army Corps of Engineers

Role	First Name	Last Name	Company
Member	Mickel	Saad	Hitachi ABB Power Grids
Member	Raja	Kuppuswamy	Dynamic Ratings, Inc.
Member	Akash	Joshi	Black & Veatch
Guest	Malia	Zaman	IEEE
Member	John	Foschia	SPX Transformer Solutions, Inc.
Guest	Cihangir	Sen	Duke Energy
Member	Stacey	Kessler	Basin Electric Power Cooperative
Guest	Ryan	Bishop	Minnesota Power
Member	Daniel	Weyer	Nebraska Public Power District
Member	Janusz	Szczechowski	Maschinenfabrik Reinhausen
Guest	Brady	Nesvold	Xcel Energy
Guest	Zachery	Weiss	WEG Transformers USA Inc.
Member	Deepak	Kumaria	Hitachi ABB Power Grids
Guest	Nikolaus	Dillon	Dominion Energy
Guest	George	Partyka	PTI Transformers
Guest	Nitesh	Patel	Hyundai Power Transformers USA
Member	Ion	Radu	Hitachi ABB Power Grids
Guest	Caroline	Peterson	Xcel Energy
Guest	Adam	McDonald	CenterPoint Energy
Guest	Shiva	Rampersad	Dow Chemical Company
Member	Brad	Staley	Salt River Project
Guest	Muhammad Ali Masood	Cheema	Northern Transformer
Guest	Gilles	Bargone	FISO Technologies Inc.
Guest	Dervis	Tekin	Meramec Instrument Transformer Co.
Guest	Kyle	Heiden	EATON Corporation
Member	David	Calitz	Siemens Energy
Member	Sergio	Hernandez Cano	Hammond Power Solutions
Member	Darrell	Mangubat	Siemens Power Operations Inc.
Member	Moonhee	Lee	Hammond Power Solutions
Guest	Hugh	Waldrop	Memphis Light, Gas & Water
Member	Sylvain	Plante	Hydro-Quebec
Guest	Joaquin	Martinez	Siemens Energy
Guest	Samragni	Dutta Roy	Siemens Energy
Guest	Dmitriy	Klempner	Southern California Edison
Guest	Kyle	Stechschulte	American Electric Power
Guest	Shawn	Gossett	Ameren
Guest	Afshin	Rezaei-Zare	York University
Guest	Eric	Doak	D4EnergySolutions LLC

Role	First Name	Last Name	Company
Guest	Jonathan	Sinclair	PPL Electric Utilities
Guest	Saramma	Hoffman	PPL Electric Utilities
Guest	Yaquan (Bill)	Li	BC Hydro
Guest	Matthew	McFadden	Oncor Electric Delivery
Guest	Hugo	Avila	Hitachi ABB Power Grids
Guest	Jeffrey	Door	H-J Family of Companies
Guest	Zachary	Draper	Delta-X Research Inc.
Guest	Tim	Rocque	SPX Transformer Solutions, Inc.
Guest	Juan	Acosta	Ergon, Inc.
Guest	Megan	Eckroth	EATON Corporation
Guest	Ashmita	Niroula	Ergon, Inc.
Guest	Raymond	Frazier	Ameren
Guest	Onome	Avanoma	Transformer Consulting Services Inc.
Guest	Alan	Washburn	Burns & McDonnell
Guest	Pragnesh	Vyas	Sunbelt-Solomon Solutions
Guest	Chris	Powell	Intermountain Electronics
Guest	Parag	Upadhyay	ABB Inc.
Guest	Susan	Bonfiglio	Western Area Power Admin.
Guest	Duy	Vo	Central Maine Power (AVANGRID)
Guest	Evgenii	Ermakov	Hitachi ABB Power Grids
Guest	Brandon	Dent	Memphis Light, Gas & Water
Guest	Jaroslaw	Chorzepa	ABB Inc.
Guest	James	Holt	Memphis Light, Gas & Water
Guest	Darrell	Banks	Memphis Light, Gas & Water
Guest	Michael	Warntjes	American Transmission Co.
Guest	Hossein	Nabi-Bidhendi	ABB Inc.
Guest	Jacques	Vanier	Electro Composites (2008) ULC
Guest	Angela	Amador	EATON Corporation
Guest	Derek	Hollrah	Burns & McDonnell
Guest	Albert	Sanchez	Knoxville Utilities Board
Guest	Balakrishnan	Mani	Virginia Transformer Corp.
Guest	Robert	Shepherd	Bruce Power
Guest	Trevor	Mattson	OMICRON Electronics Corp USA
Guest	Dinu	Amarasinghe	Bruce Power