

Annex C Distribution Subcommittee – Chair: Ed Smith

**March 30, 2022
Denver, Colorado**

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

C.1 General Opening

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

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

The Fall 2021 meeting minutes were reviewed, a motion was made to approve by Gary Hoffman, seconded by Al Traut, and approved by unanimous acclamation of the members in attendance.

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

C.2 Working Group and Task Force Reports

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

Al presented the following minutes from the working group meeting on March 28, 2022 at 11:00 a.m. with 68 in attendance.

1. Call to order
The meeting was called to order by the Chair (Al Traut) at 11:00AM on Monday, March 28, 2022.
2. Essential patent statement and copyright slides.
There was a call for essential patent by the Chair. There were none brought forward. The Chair announced if there was one to let the Chair or Vice Chair know. The IEEE copyright slides were shown to the WG.
3. Quorum Verification
A members list was displayed, and members were asked to complete digital poll. **30 of 49** members were present. A Quorum was declared.
4. Approval of agenda for this meeting
The Chair sent out the Agenda prior to the meeting for review. Agenda was approved without any opposition.
5. Approval of minutes of the previous meeting

The Chair sent out the minutes of the F21 minutes prior to the meeting for review. Minutes were approved without any opposition.

6. Chair Report

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

7. Old Business

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

8. New Business

No new business

9. Next meeting--date and location

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

10. Adjournment

The meeting was adjourned at 12:00 PM

Submitted by: Kendrick Hamilton

Date: 28/03/2022

ATTENDANCE

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

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

██████ C57.12.28, .29, .30, .31 & C57.12.32 – Enclosure Integrity – Dan Mulkey

Dan Mulkey presented the following minutes from the working group meeting on March 29, 2022 at 8:00 a.m. in with 48 in attendance.

- 1) Dan Mulkey called the meeting to order at 8:01 AM MST. Group introductions were made.
- 2) Opening remarks and announcements
 - a) AMS system has been discontinued. Paper rosters were circulated.
- 3) Dan Mulkey reviewed IEEE SA Copyright Policy and Essential Patent Claims. No issues were raised.
- 4) Membership changes were noted:
 - a) Added: Jane Hall, Robert Reepe, Michael Zarnowski
 - b) Changed to Guest: Cory Morgan, Robert Stinson, Matthew Enders, Glenn Anderson
- 5) Quorum was verified. The working group consisted of 58 members, requiring 29 for quorum. 30 members were counted at the start of the meeting. Attendance records later confirmed 29 members attended.
- 6) Dan Mulkey requested approval of the agenda. Paul Chisholm made a motion, second by Ken Hampton. Agenda was unanimously approved.
- 7) Dan Mulkey requested approval of the minutes. Tom Dauzat made a motion, second by Steve Shull for approval of the minutes. Minutes were unanimously approved.
- 8) Status of Standards:
 - a) C57.12.28 Standard for Pad-Mounted Equipment – Enclosure Integrity, Published Jul 15, 2014
 - i. Expires: 12/31/2024
 - ii. PAR expiration: 12/31/2024
 - iii. Status: in progress, draft 1.5
 - b) C57.12.29 Standard for Pad-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published August 8, 2014
 - i. Expires: 12/31/2024
 - ii. PAR expiration: 12/31/2024
 - iii. Status: in progress, draft 1.5
 - c) C57.12.30 Standard for Pole-Mounted Equipment – Enclosure Integrity for Coastal Environments, Published March 4, 2021
 - i. Expires: 12/31/2030
 - d) C57.12.31 Standard for Pole Mounted Equipment – Enclosure Integrity, Published February 26, 2021
 - i. Expires: 12/31/2030
 - e) C57.12.32 Standard for Submersible Equipment – Enclosure Integrity, Published Aug 8, 2019
 - i. Expires: 12/31/2029
- 9) Old business:
 - a) Dan Mulkey reviewed status of standards. There are two meetings left to finish C57.12.28 and C57.12.29.
 - b) Taskforce Report: Special Pad-mount Tests (pry-bar, wire probe)
 - i) Taskforce Members: Gary King, Shelby Walters, Michael Zarnowski.
 - ii) Dan Mulkey reviewed proposed wording so the standards now reference a generic spring scale rather than an Iron Man scale
 - iii) Tom Dauzat made a motion to accept proposed wording, second by Michael Zarnowski. Agenda was unanimously approved.

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

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

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

Submitted by: Audrey Siebert-Timmer

Date: March 29, 2022

List of Members:

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

List of Guests:

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

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

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

1. The Chair called the meeting to order at 3:15 P.M. MST on March 28, 2022. Attendees identified themselves by name and affiliation verbally. A Poll was taken to identify WG members to which a quorum was established.
2. Agenda approval
The Chair displayed the Agenda for this meeting. The Chair asked for any objections to the displayed Agenda. Hearing none, the Chair declared the Agenda approved as shown.
3. Minutes approval
The Chair commented that the Meeting Minutes of the last meeting were posted on the Transformer Committee website. The Chair asked for any corrections to the Meeting Minutes as posted. Hearing none, the Chair declared the minutes approved as posted.
4. Confirmation of IEEE SA Essential Patent Statement
The patent information request was displayed to the WG and the chair provided an opportunity for participants to identify patent claim(s)/patent application claim(s) and/or if a participant is personally aware of patent claim(s)/patent application claim(s) that may be essential for the use of this standard. There were no responses to this request so no patent claim(s)/patent application claim(s) were identified.
5. IEEE SA Copyright Policy Statement
IEEE-SA's copyright policy is described in Clause 7 of the *IEEE-SA Standards Board Bylaws* and Clause 6.1 of the *IEEE-SA Standards Board Operations Manual*. The Chair stated that any material submitted during standards development, whether verbal, recorded, or in written form, is a Contribution and shall comply with the IEEE-SA Copyright Policy. The Chair displayed this copyright policy to the WG.
6. Old Business

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

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

7. New Business

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

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

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

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

There was no other new business.

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

Submitted by: Scott Dahlke.

Date: 3/29/2022

Attendance:

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

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

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

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

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

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

C57.12.36 – Distribution Substation Transformers – Jerry Murphy

This working group did not meet.

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

Ali Ghafourian presented the following minutes from the working group meeting on March 28, 2022 at 1:45 p.m. with 42 in attendance.

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

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

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

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

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

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

3. Approval of agenda

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

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

Kenneth (Ken) Hampton seconded the Motion.

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

4. Approval of minutes of previous meeting

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

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

Avijit Shingari seconded the Motion.

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

5. Draft review

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

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

6. Old Business

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

7. New Business

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

8. Next meeting – Date and Location

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

Dates: October 16th – 20th, 2022

9. Adjournment

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

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

Date: Thursday, March 29, 2022

List of Attendees, Affiliations, Membership Status:

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

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

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

33	Anthony Coker	M&I Materials	Guest
34	Thomas Dauzat	PROLEC GE	Guest
35	Herton DeOliveira Filho	PSE&G	Guest
36	Cgsar Diaz	EATON Corporation	Guest
37	Hector Garza	Orto de Mexico	Guest
38	Martin Munoz Molina	Orto de Mexico	Guest
39	Daniel Posadas	PROLEC S.A. DE C.V.	Guest
40	Albert Sanchez*	Knoxville Utilities Board	Guest
41	Stefan Schindler	Maschinenfabrik Reinhausen	Guest
42	Liz Sullivan*	Dominion Energy	Guest

██████ C57.12.39 – Tank Pressure Coordination – Carlos Gaytan

This working group did not meet

██████ Task Force on Transformer Efficiency and Loss Evaluation – Phil Hopkinson

Phil presented the following minutes from the task force meeting on March 28, 2022 at 9:30 a.m. There were 77 in attendance for this meeting.

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

c. Dan Mulkey on Loading

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

d. Steve Rosenstock on loading forecast

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

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

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

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

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

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

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

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

New Dual Nameplate kVA for Distribution Transformers–

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

f. Tom Prevost on Solid Material

g. Casey Ballard on non-Kraft Paper materials

h. Al Traut for new Dual kVA Nameplate transformer ratings

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

i. Comments

8. Assignments for next meeting

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

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

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

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

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

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

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

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

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

1. Chair called the meeting to order at 1:45pm MDT. Members introduced themselves.
2. Total attendance of 21 is listed below. 11 of 21 members present and quorum was verified (52%). 4 guests requested membership.
3. Chair called for identification of essential patents pertaining to the work of this WG. None brought forward. Copyright policy presented. No issues identified.
4. Motion to approve meeting agenda (Steve Shull/Mike Thibault). Approved unanimously.
5. Motion to approve Fall 2021 meeting minutes (Lee Matthews/Ken Hampton). Approved unanimously.
6. Chair Report
 - a. PAR for revision of C57.12.35 approved on 6/13/19 with an expiration date of 12/31/2023. The current published document also expires 12/31/2023.
 - b. WG goal is to vote to move the document to ballot at the Fall 2022 meeting.

7. Old Business

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

8. New Business - None

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

10. Meeting adjourned at 2:25pm MDT.

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

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

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

Guest* = Requesting Membership

C.3 Old Business

- No old business was discussed

C.4 New Business

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

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

C.5 Chairman's Closing Remarks and Announcements

Josh had no closing comments to the SC.

C.6 Adjournment

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

List of Attendees and Affiliations:

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

Annex C

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

Annex C

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