Minutes of Meeting

Working Group C37.015 Guide for the Application of Shunt Reactor Switching

Location:Wyndham Grand Orlando Resort Bonnet Creek (Orlando, Florida)Date:Wednesday April 9th 2025 (08:00-9:45 AM EDT)Participants:63 Total in Attendance (28 of 45 Members - 62%)

WG Chair: Mike Crawford WG Secretary: Luke Collette

Call to Order

WG Chair called the meeting to order and presided over the WG meeting.

Introduction of Attendees

Roster attained through Microsoft Teams chat/attendee list. 63 Total in Attendance (28 of 45 Members - 62%). Quorum met.

IEEE Copyright Policy and Call for Patents

Patent and copyright policy presented. WG Chair made a call for any known essential patents. No Patent claims identified.

Approval of Agenda

WG Chair reviewed the agenda.

- Motion to Approve Agenda: Andy Keels
- 2nd to Motion: Craig Polchinski
- Approved by unanimous consent

Approval of Previous MOM (Fall 2024 & Virtual 2025)

WG Secretary reviewed the previous MOM.

- Motion to Approve both MOM: Andy Keels
- 2nd to Motion: Marcus Young
- Approved by unanimous consent

Review of Current Status

First draft of revision is completed and ready for review of the WG.

Review Changes Included in Draft Revision

WG reviewed the draft, and the following are key notes from the following discussion.

- WG Secretary presented draft
- Skipped editorial items, and moved to technical items
 - Section 2.2 Frequencies:

- Recommendation of wording to be provided by Andy Keels related to timing of naturally occurring current zeros
- Delayed current zero section (3.2.5.5)
 - Volunteer for additions (Urmil Parikh)
- Compensated lines and cables 3.2.5.5.1
 - Referencing C37.012 for section on compensated lines
 - No comments for the wording that was added
- o 3.2.5.5.2 Fault near shunt reactors
 - Term 'Bolted Fault' to be defined = fault with negligent impedance
 - How close to current zero (current chop) before sending a trip signal; add statement to discuss with manufacturer for actual guidance
- 4. Limitation of Overvoltages table:
 - Added wording for experiences of using the mitigation techniques described in the table
 - Add better wording for determining solution as it depends on circuit breaker characteristics and the system.
 - Include another mitigation solution (surge suppressors across the circuit breaker)
 - Add disadvantage for external arresters across breaker noting they can fail and short CTs
 - Add mitigation solution of bypassing neutral reactor on cases grounded through a reactor
 - Controlled switching solution (Use 'unintentional re-ignition' wording)
 Need to discuss with manufacturer to determine targeted points on wave
 - Change "minimum arcing time" to "sufficient (appropriate) reignition-free window"
 - Add comments to TRV control caps (L-G surge capacitor) that they are often used for the case with an internal shunt reactor fault
- A.1A.1 Table Chopping Number
 - Vacuum breakers typically have a chopping current, not a chopping number
 - Added note to that effect
- Add Note C of Annex E to mitigation table
- Table B.2 should be sorted high voltage to low voltage, check that all tables are consistent
- Add 'gapped core' to oil filled reactor references in Annex B and maybe elsewhere
- o Extend an invite to David Caverly for review of this draft
- Annex C system characteristics harmonized with C37.011
- Annex D no significant change
- Annex E no significant change
- Annex F no significant change
- Annex G: New annex for study guidance
 - This was a large portion of the additions to the draft

- Craig Polchinski presented draft additions
 - Possibly add example for neutral reactor
 - Add note to section for chopping number versus arcing time
 - Add consideration for frequency of TRV
 - Craig Polchinski and Jan Weisker to work on additional plots for clarification
 - Guidance to be provided on simulation difference oscillation modes during a reignition.
 - Add a note for parallel capacitance (grading caps). Provide guidance on typical values if possible.
 - Does the annex need to add 'example' to plots?
 - Add guidance on selecting capacitance and how to modify measured capacitance values (i.e., from 60 Hz tests) to be applicable for studies at the appropriate TRV frequency.
- Move definitions, symbols, abbreviations to beginning of document per IEEE Standards Manual

<u> Plan Moving Forward</u>

WG reviewed the following plan:

- Review Changes Included in Draft Revision
 - Due Date: Spring In-Person Meeting: April 9th 2025
- WG Completes Review of Draft and Provides Comments for Discussion
 - Due Date: Spring In-Person Meeting: June 30th 2025
- Review Changes Included in 2nd Draft Revision
 - Due Date: Fall In-Person Meeting: October 2025
- WG Vote to Request Approval from Standards Committee to Initiate SA Ballot Process
 - Due Date: Fall In-Person Meeting: October 2025

Next Meeting

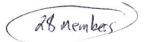
The following meetings are planned:

- Summer 2025: Virtual at end of July (to be scheduled)
- Fall 2025: October 5-9, Peppermill Resort, Reno, NV

<u>Adjournment</u>

Meeting adjourned by the WG Chair at 9:45 AM (EDT).

Reported by: Luke Collette WG Secretary & Mike Crawford WG Chair



Place / Date of meeting: Wyndham Grand Orlando Resort Bonnet Creek, Orlando, FL, 4/9/2025

Initial to denote					Request
attendance	Last name			Role	Membershi
	Antantis	Michelle	Duquesne Light Co.	Voting Member	
	Aristizabal	Mauricio	Hitachi Energy	Non-Voting Member	
	Banda	Eloy	Siemens Energy	Non-Voting Member	
	Beckel	Andy	Xcel Enegy	Voting Member	
0.10	Beecher	Zachary	Power Grid Components	Non-Voting Member	
DHB	Benedict	Dan	PPL	Voting Member	
	Benge	Jonathan	OG&E	Non-Voting Member	
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SB		Sanket	Oncor	Voting Member	1 mar 1
AB	Bornuat /	Albane	GE Grid Solutions VERNOVA	Non-Voting Member	
5°	Brogdon	Jeff	Georgia Transmission	Voting Member	
	Bronsveld	Arjan	Hitachi Energy Sweden	Voting Member	
	Brooks	Adam	Duke Energy	Non-Voting Member	
AB	Bufi	Arben	Meiden America Switchgear	Voting Member	
SB	Byreddy	Sudarshan	Burns & McDonnel	Voting Member	
0.0	Chovanec	Andrew	Power Grid Components	Voting Member	
MAL	Christian	Michael	ABB	Voting Member	
2C-	Collette	Lucas	Duquesne Light Co.	Secretary	
Mga	Crawford	Mike	Mitsubishi Electric Power Products, Inc	Chair	
	Cunningham	Jason	Southern States	Voting Member	
	Cuppett	Matthew	Hitachi Energy	Voting Member	
	Diaz	Lissy	Florida Power & Light	Voting Member	
	Eastman	Maxwell	Black & Veatch	Non-Voting Member	
	Hermosillo	Victor	GE Grid Solutions	Voting Member	
HH	Hirz	Harry	Vesco	Non-Voting Member	
	Irwin	Todd	GE Grid Solutions	Non-Voting Member	
.0)	Jarnigan	Chris	Southern Company	Non-Voting Member	
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	Kurinko		Hitachi Energy	Voting Member	
	Lakshminaray		Doble Engineering	Non-Voting Member	1917
	Lebrun	Mathieu	Vizimax	Non-Voting Member	
	Lopez	Leo	Wika	Non-Voting Member	
CM	Ма	Chunming	Burns & McDonnel	Voting Member	
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	Masterson		Meiden America Switchgear	Voting Member	
	May		Southern Company	Voting Member	
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	Meekins		Southern States	Voting Member	
A/	Nenning	Andreas	Omicron Electronics	Voting Member	
	Nolte		Kiewit	Non-Voting Member	
	Ordein		Dominion Energy	Voting Member	
	Orosz		CBT&S LLC	Non-Voting Member	
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MP			Xcel Enegy	Voting Member	/
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	Podgorski	2007 10	Sargent & Lundy	Voting Member	

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CHP	Polchinski	Craig	Mitsubishi Electric Power Products, Inc	Voting Member	
	Ratmiroff	Javier	GE Grid Solutions	Voting Member	
	Rebovich	Justin	GE Grid Solutions	Non-Voting Member	
-	Roberts	Brian	Southern States	Non-Voting Member	5
	Rogers	Jon	Siemens Energy	Voting Member	1
TOS	Schiffbauer	Dan	Toshiba International Corp	Voting Member	
	Schuetz	Carl	ATC FXCUSED	Voting Member	
	Schwartz	Skyler	ATC	Non-Voting Member	
JTS	Scott	Jeff	Ameren	Non-Voting Member	
	Shirode	Aniket	ABB	Voting Member	
MAL	Skidmore	Michael	AEP	Voting Member	
	Sneath	Jeremy	Electranix Corp	Voting Member	-
	Steigerwalt	Don	Duke Energy	Non-Voting Member	
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/	Tillery	Tim	Howard Industries	Non-Voting Member	
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	Weisker	Jan	Siemens Energy	Voting Member	
	Wen	Jerry	BC Hydro	Voting Member	
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SWY	Young	Marcus	Mitsubishi Electric Power Products, Inc	Voting Member	
- 0	Youssef	Mina	Eaton	Voting Member	
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	Ordein	Fernando	Dominion Energy	Voting Member	
	Orosz	Miklos	CBT&S LLC	Non-Voting Member	
	Palazzo	Mirko	Hitachi Energy	Non-Voting Member	
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	Pingle	Sachin	ABB	Non-Voting Member	
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Place / Date of meeting: <u>Wyndham Grand Orlando Resort Bonnet Creek</u>, Orlando, FL, 4/9/2025





Working Group

C37.015 Guide for the Application of Shunt Reactor Switching

> Chair: Mike Crawford; Secretary: Lucas Collette April 9, 2025

Power & Energy Society*

Agenda

- Call to Order
- Introduction of Attendees
 - Sign-in Sheet
- Review of Patent and Copyright Slides
 - Call for patents
- Membership List
- Approval of Agenda
- Approval of Previous MOMs
- Current Status
- Review Changes Included in Draft Revision
- Plan Moving Forward
- Next Meeting
- Adjournment

IEEE SA Copyright Policy



IEEE SA COPYRIGHT POLICY

By participating in this activity, you agree to comply with the IEEE Code of Ethics, all applicable laws, and all IEEE policies and procedures including, but not limited to, the IEEE SA Copyright Policy.

- Previously Published material (copyright assertion indicated) shall not be presented/submitted to the Working Group nor incorporated into a Working Group draft unless permission is granted.
- Prior to presentation or submission, you shall notify the Working Group Chair of previously Published material and should assist the Chair in obtaining copyright permission acceptable to IEEE SA.
- For material that is not previously Published, IEEE is automatically granted a license to use any material that is presented or submitted.

IEEE SA STANDARDS

IEEE SA Copyright Policy



IEEE SA COPYRIGHT POLICY

The IEEE SA Copyright Policy is described in the IEEE SA Standards Board Bylaws and IEEE SA Standards Board Operations Manual

 IEEE SA Copyright Policy, see Clause 7 of the IEEE SA Standards Board Bylaws <u>https://standards.ieee.org/about/policies/bylaws/sect6-7.html#7</u> Clause 6.1 of the IEEE SA Standards Board Operations Manual <u>https://standards.ieee.org/about/policies/opman/sect6.html</u>

IEEE SA Copyright Permission

- https://standards.ieee.org/content/dam/ieee-standards/standards/web/documents/other/permissionltrs.zip

IEEE SA Copyright FAQs

- http://standards.ieee.org/faqs/copyrights.html/

[■]IEEE SA Best Practices for IEEE Standards Development

- http://standards.ieee.org/develop/policies/best_practices_for_ieee_standards_development_051215.pdf

Distribution of Draft Standards (see 6.1.3 of the SASB Operations Manual)

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





PARTICIPANTS HAVE A DUTY TO INFORM THE IEEE

- Participants <u>shall</u> inform the IEEE (or cause the IEEE to be informed) of the identity of each holder of any potential Essential Patent Claims of which they are personally aware if the claims are owned or controlled by the participant or the entity the participant is from, employed by, or otherwise represents
- Participants <u>should</u> inform the IEEE (or cause the IEEE to be informed) of the identity of any other holders of potential Essential Patent Claims

Early identification of holders of potential Essential Patent Claims is encouraged







Cause an LOA to be submitted to the IEEE SA (patcom@ieee.org); or

- Provide the chair of this group with the identity of the holder(s) of any and all such claims as soon as possible; or
- Speak up now and respond to this Call for Potentially Essential Patents

If anyone in this meeting is personally aware of the holder of any patent claims that are potentially essential to implementation of the proposed standard(s) under consideration by this group and that are not already the subject of an Accepted Letter of Assurance, please respond at this time by providing relevant information to the WG Chair







OTHER GUIDELINES FOR IEEE WORKING GROUP MEETINGS

- All IEEE SA standards meetings shall be conducted in compliance with all applicable laws, including antitrust and competition laws.
 - Don't discuss the interpretation, validity, or essentiality of patents/patent claims.
 - Don't discuss specific license rates, terms, or conditions.
 - Relative costs of different technical approaches that include relative costs of patent licensing terms may be discussed in standards development meetings.
 - Technical considerations remain the primary focus.
 - Don't discuss or engage in the fixing of product prices, allocation of customers, or division of sales markets.
 - Don't discuss the status or substance of ongoing or threatened litigation.
 - Don't be silent if inappropriate topics are discussed. Formally object to the discussion immediately.

For more details, see IEEE SA Standards Board Operations Manual, clause 5.3.10 and Antitrust and Competition Policy: What You Need to Know at http://standards.ieee.org/develop/policies/antitrust.pdf







PATENT-RELATED INFORMATION

The patent policy and the procedures used to execute that policy are documented in the:

- IEEE SA Standards Board Bylaws (http://standards.ieee.org/develop/policies/bylaws/sect6-7.html#6)
- IEEE SA Standards Board Operations Manual (http://standards.ieee.org/develop/policies/opman/sect6.html#6.3)

Material about the patent policy is available at http://standards.ieee.org/about/sasb/patcom/materials.html

If you have questions, contact the IEEE SA Standards Board Patent Committee Administrator at patcom@ieee.org





Voting Members (45)

- Michelle Antantis
- Andy Beckel
- Dan Benedict
- Sanket Bolar
- Jeff Brogdon
- Arjan Bronsveld
- Arben Bufi
- Sudarshan Byreddy
- Andrew Chovanec
- Michael Christian
- Lucas Collette
- Mike Crawford
- Jason Cunningham
- Matthew Cuppett
- Lissy Diaz
- Victor Hermosillo

- Andy Keels
- Carl Kurinko
- Chunming Ma
- Vincent Marshall
- Paul Masterson
- Steven May
- Gary Meekins
- Andreas Nenning
- Fernando Ordein
- Mark Peterson
- Damian Podgorski
- Craig Polchinski
- Javier Ratmiroff
- Jon Rogers
- Dan Schiffbauer
- Carl Schuetz

- Aniket Shirode
- Michael Skidmore

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- Jeremy Sneath
- John Tarleton
- Vernon Toups
- John Webb
- Casey Weeks
- Jan Weisker
- Jerry Wen
- Rich York
- Marcus Young
- Mina Youssef
- Sam Zaharko

Power & Energy Society*

WG Voting

- Approval of Agenda
- Approval of Previous MOM
 - <u>Fall 2024</u>
 - <u>Virtual 2025</u>

Power & Energy Society*

Agenda

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- Adjournment

Current Status

PAR Approved

• Link to <u>PAR</u>

First draft of document revision is completed and ready for review of the WG.

PES

Power & Energy Society*

Review Changes Included in Draft Revision



First Draft - PC37.015 d1

Items to be addressed based on previous WG meetings:

- Study Guidance for Reactor Switching (Annex)
- Clause 4 Limitation of Overvoltages (Mediation Table 1)
- Survey of In Service Experience
- Delayed Current Zero
- Chopping Current for VCB
- Shunt Reactor Capacitance
- Restrike or Reignition Monitoring
- General Review of Document

Plan Moving Forward



- Due Date: Spring In-Person Meeting: April 9th 2025
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IFFF

– Due Date: Fall In-Person Meeting: Reno October 2025

Next Meeting

- Next Virtual Meeting
 - Date: July End, 2025 (10AM EST? Doodle to pick date/time)

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- Next In-Person Meeting
 - Fall 2025: October 5-9, Peppermill Resort, Reno, NV



Adjourn