Minutes of Meeting
Working Group C37.010 – Application Guide for AC High-Voltage Circuit Breakers > 1000 VAC Rated on a Symmetrical Basis

Location: Hilton Lake Champlain, Burlington, VT
Date: **Monday, October 17th, 2022 (08:00-09:45 EDT)**
Quorum: Membership Count: 25 Members Present: 19

Agenda

Chairman, Andy Keels w/ kEElectric Engineering, PLLC called the meeting to order and presented the agenda.
Vice Chairman, Luke Collette w/ Duquane Light Co. and
Secretary, Jeremy Hensberger w/ Mitsubishi Electric Power Products checked attendance and quorum status.
Chairman reviewed how to login to the IEEE meeting attendance system.

Introduction of Members and Guests

Introductions and attendance gathered in-person.
43 Total in Attendance (**19** Members, **24** Guests)

IEEE SA Patent & Copyright Policy Review

IEEE SA patent and copyright policies presented. See meeting slides. No patent claims identified.

Previous Meeting's Minutes were displayed on screen and on iMeet workspace
Secretary reviewed minutes from Spring 2022 meeting.
Motion: Approve previous meeting's minutes as posted: John Webb
2nd to the Motion: Michael Christian
Vote: Approved without objection/abstention

Review of IEEE SA Acceptance of PAR Study Group

- See meeting slides documenting the Scope, Purpose, Need for the Project and Proposed Additional Content. Slides available on the C37.010 Working Group IMeet workspace. Permission access list has been updated to guests who requested membership during the Spring 2022 meeting in Orlando, FL.
- Comment: Scope (Section 5.2) defines the range of changes allowable. "Additional content" can be considered without issue to scope because this is a full revision. Chair will review any potential changes to the PAR.

Review of IEEE SA Imeet workspace

- See meeting slides.
- Updated files for the WG and notices will be posted in the Imeet workspace. Members should have received an invitation to join with a link. Contact the WG officers if an email invitation was not received or if access is requested.
- Access to Imeet may be interrupted if participants did not accept the IEEE privacy policy update request. If this has occurred, membership may have been deleted from IEEE database. Contact Jennifer Santulli if access issues occur.

Discussion on how to address updates to in-active and non-current standard references.

- Chair displayed list of impacted standards and requested call for volunteers to review standards. Request: Identify in-active or non-current reference and review impact. Noted that it is acceptable to refer to in-active or non-current standards since C37.010 is an application guide.
    - Kirk Smith, Aaron Rexroad, Robert Hanna volunteered to help review IEEE references
    - Jan Weiser volunteered to review IEC 62271-100 references. Standard is allowed to reference IED 62271-100 as often as necessary, but the wording cannot be included.

Review of C37.010 impact of inverters on fault calculation methods

- Carl Schuetz presented (see meeting slides)
    - Inverted based resources (wind, photovoltaic, battery generation capacity) are coming online and will be increasing in the future years. Penetration into the distribution class of equipment appears realistic, while transmission system has not been observed yet.
    - Study group formed to review and update examples in C37.010. Industry is looking for guidance in C37.010 and without this guidance, there are limited resources available. There is an industry need to provide a recommendation for the most appropriate calculation methods related to this subject.
    - Reviewed PES-TR-78 and evaluated different inverter types and present methodologies.
    - The Chair requested a formal email to document the requests of the working group.
    - Spring 2023 meeting will be the next update on the progress of this review.

Schedule

Chair provided a schedule for completion of the PAR Study Group C37.010. Refer to meeting slides. The chair plans to schedule workgroup meetings four times per year and alternate between virtual and in-person.

Next work group meetings will be an on-line meeting on Friday, January 27, 2023 @1:00pm EST and in-person at next Switchgear Committee meeting in April 2023 in Clearwater, FL.

Membership to the Study Group will be indicated by each participant on the roster and recorded in the minutes.

Adjournment

Motion: Adjourn Meeting: Michael Christian

2nd to the Motion: John Webb

Vote: Approved without objection/abstention

Meeting adjourned by the chair at 09:45 (EDT).

Reported by:

Jeremy Hensberger & Andy Keels

C37.010 PAR Working Group

Application Guide for AC High-Voltage Circuit Breakers >1000Vac Rated on a Symmetrical Basis

Monday, October 17th, 2022

8:00 – 9:45 AM EST

Chair: T. Andy Keels w/ kEElectric Engineering, PLLC

Secretary: Jeremy Hensberger w/ MEPPI

Vice-Chair: Lucas Collette w/ Duquesne Light Co.

Starting Document: IEEE Std C37.010-2016 (Revision of C37.010-2019)

Agenda

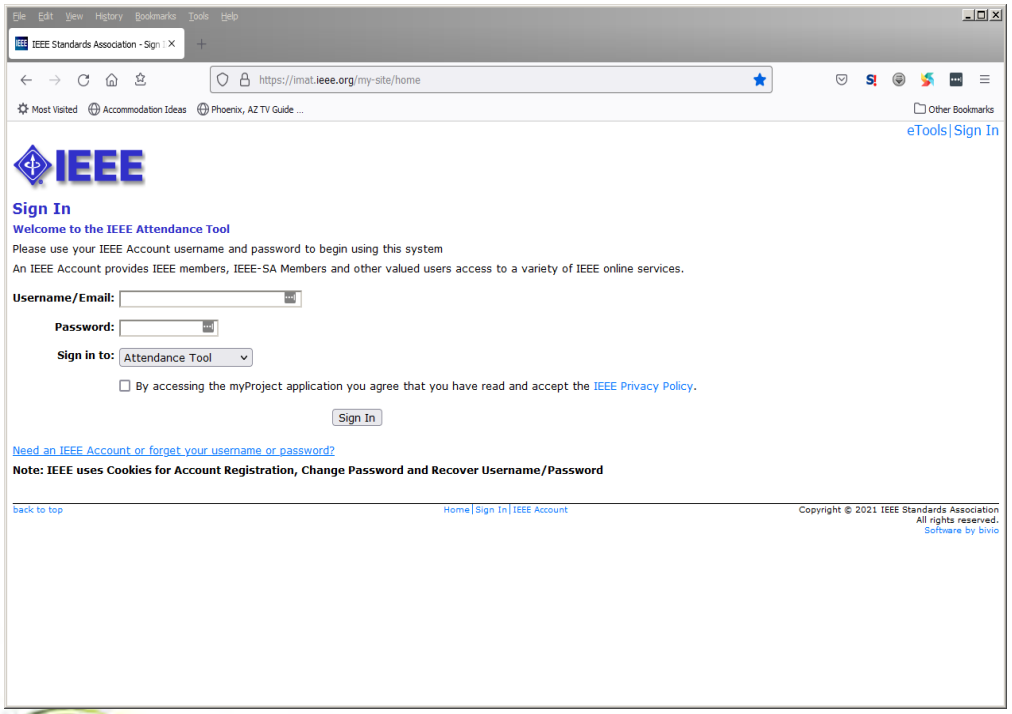
1. Chairman's call to order & remarks
2. Introduction of attendees:

   Please type your *Name*, *Affiliation*, *Location* in the chat
3. Attendance Logging Instructions
4. IEEE Patent and Copyright Policy (*Obligatory*)
5. IEEE SA Accepted PAR
6. Anticipated Schedule (*Best laid plans*)
7. iMeet Central Workspace
8. Minutes Approval
9. Discussion on how to update IEEE Std. references
10. Discussion of Inverter-based resource contributions to fault currents
11. Next meetings

Logging Your ATTENDANCE To This Meeting

There are three way to get there:

1. Go To: IEEE SA eTools, Then click on **IEEE Attendance Tool**
2. **Google:** IEEE Attendance Tool
3. Go directly to: https://imat.ieee.org/my-site/home

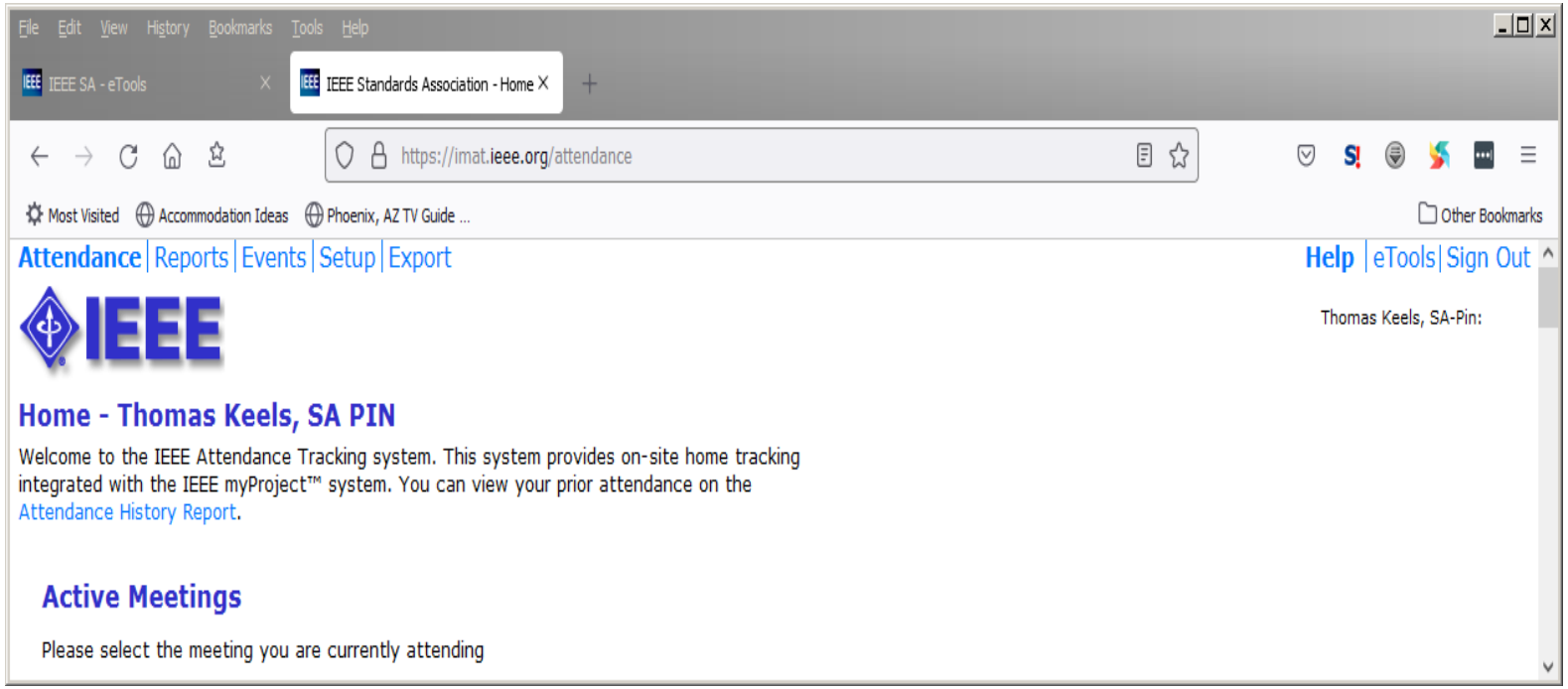


Type in the Email address & Password that you use for your IEEE activities

Don't forget to check the box acknowledging the IEEE Privacy Policy

Logging Your ATTENDANCE To This Meeting

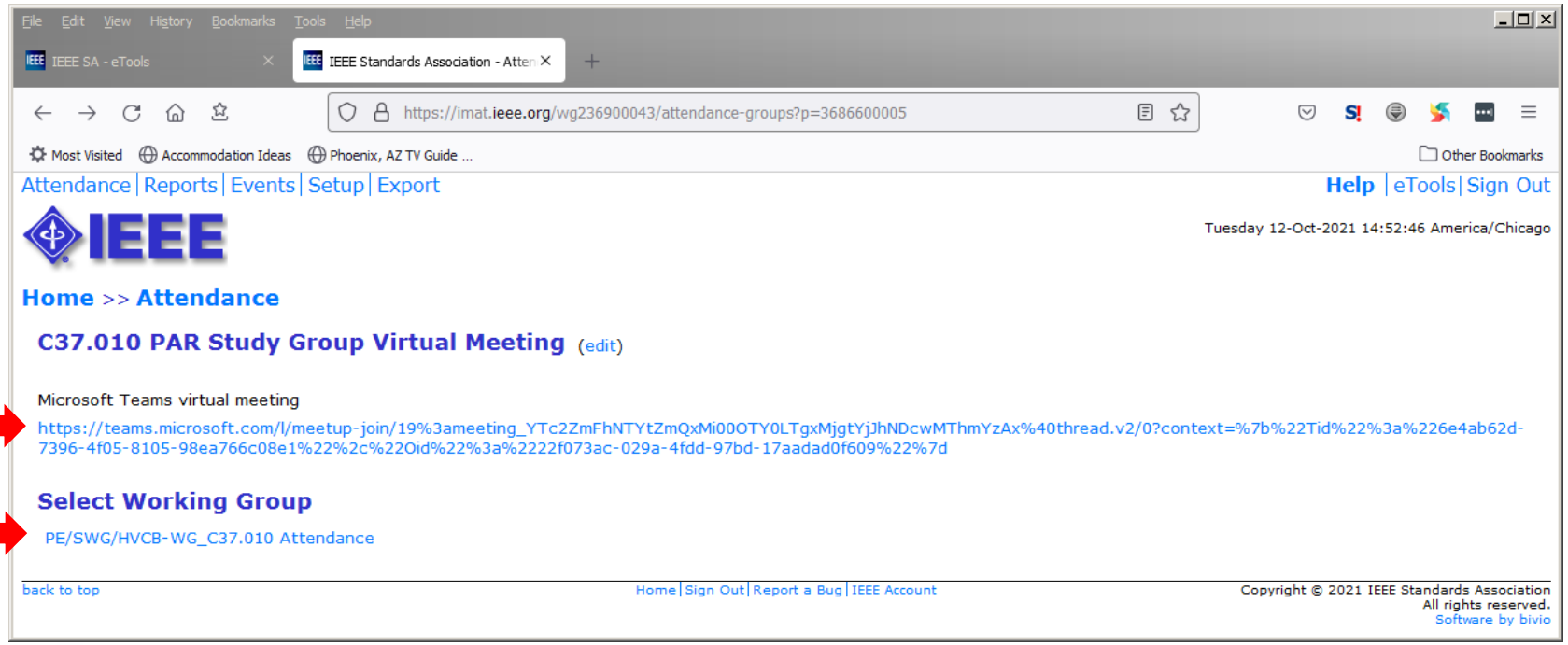
Then select the meeting you are attending
From the list of available meetings



Logging Your ATTENDANCE To This Meeting

Then select the Working Group

If it is a 'virtual meeting' the WG Chair should have the link listed here

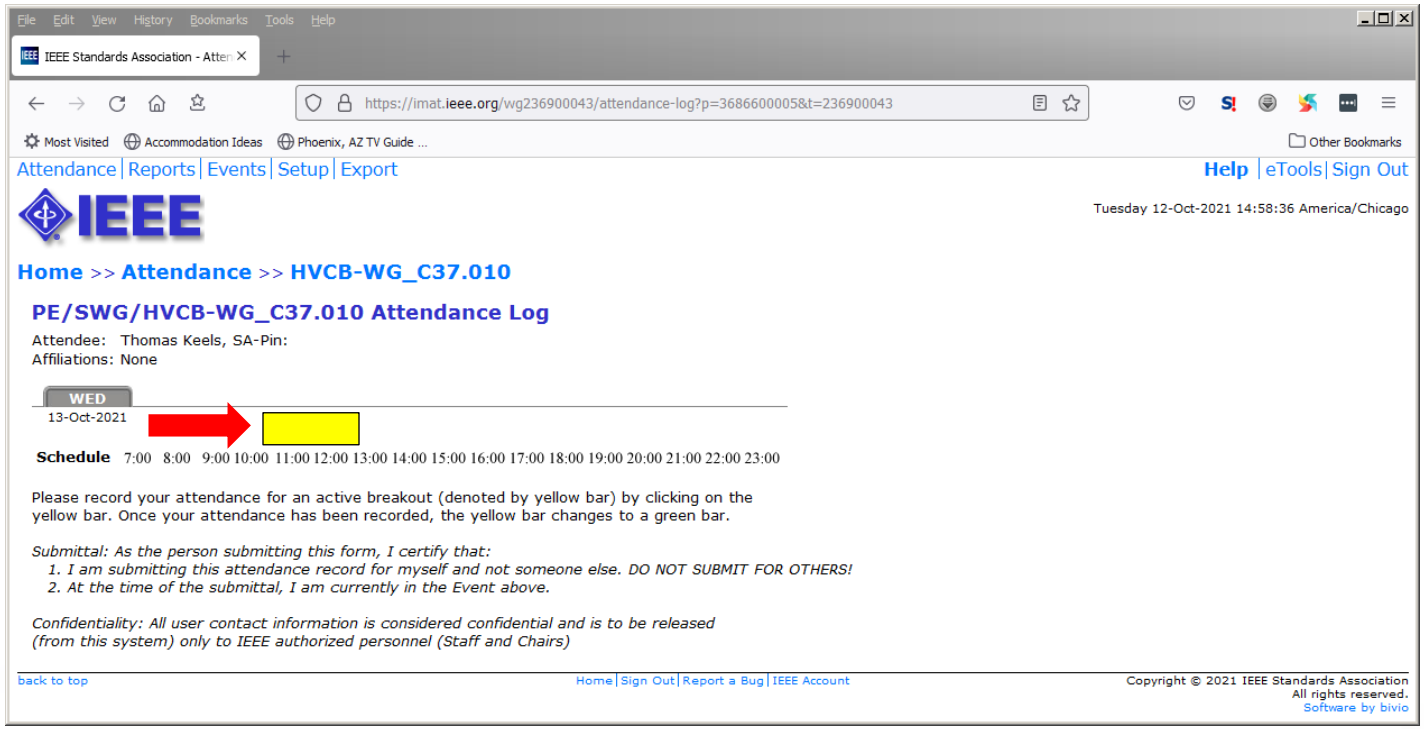


Logging Your ATTENDANCE To This Meeting

If the meeting is currently in progress then there should be a yellow box here.

Click the Yellow Box, The box will turn GREEN if your attendance is logged

You then just click Sign Out in the upper right corner



4. IEEE SA Patent Policy

Participants have a duty to inform the IEEE

- **Participants shall 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 should 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

4. IEEE SA Patent Policy

Ways to inform IEEE

- **Cause an LOA (Letter of Authority) 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

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

Other guidelines for IEEE WG 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 … do formally object.**

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

IEEE SA
STANDARDS ASSOCIATION

IEEE SA COPYRIGHT POLICY FOR PARTICIPANTS IN IEEE STANDARDS ACTIVITIES

IEEE

IEEE SA COPYRIGHT POLICY: CONTRIBUTIONS

- **Contribution:** any material that is presented verbally or in a recorded or written form (e.g. text, drawings, flowcharts, slide presentations, videos) in any IEEE standards development activity.

- **All submissions** to IEEE Standards development are Contributions

- **What does this mean?** Any material you submit is intended to be considered by the Working Group to which it was submitted. The Working Group decides whether to include the material in the IEEE SA Work Product (e.g., draft standard). Once submitted, IEEE has a license to use the material.

WHEN DO YOU NEED TO OBTAIN PERMISSION?

- **If the Contribution was previously Published.**

  - Assist the Working Group Chair in obtaining permission from the copyright owner for use by IEEE prior to submitting the material for distribution/presentation to the Working Group or including the information in the draft IEEE standard.

  - "Published" means material for which a claim of copyright is apparent (e.g., the presence of the copyright symbol ©; an explicit statement of copyright ownership or intellectual property rights; stated permission to use text; a text reference that indicates the insertion of text excerpted from a copyrighted work; indication that the material is for use by a specific entity other than IEEE, or for a specific purpose other than IEEE standards development; or a visual indication of an excerpt from another work, such as indented text).

  - Note that information that can be accessed at no cost on the web usually has copyright assertion as part of the web page or Terms and Conditions of the website, even when a claim of copyright might not be shown on specific material.

WHEN DO YOU NEED TO OBTAIN PERMISSION?

- **Participants are free to discuss any information they believe is pertinent to the work of the Working Group. However, verbal Contributions, once recorded, are subject to Copyright Law, so if verbal submissions contain excerpts from previously Published material, permission may be required before it can be included in the draft standard. An example is reading a definition from previously Published material.**

- **If there is any doubt, assist the Working Group Chair in requesting permission**
  - IEEE SA Permission Request and Response Form Templates are available and are to be used whenever requesting permission
  - If the copyright owner does not use the Response Form as is (i.e., if there are requested modifications to the form or another form is used), IEEE SA Intellectual Property Rights (IEEE SA IPR) (stds-copyright@ieee.org) has to approve the permission response prior to incorporating the material in the draft IEEE standard
  - If specific permission other than what is contained in the Permission Request and Response Form Templates is needed, contact IEEE SA IPR.

WHEN DO YOU NEED AUTHORIZATION OR CONSENT?

- **If the Contribution was <u>not</u> previously Published and there are restrictions on it.**
  - Participants need to determine whether disclosure of any Contributions that they submit to IEEE requires the prior consent of other parties and, if so, to obtain it.
    - Check with your employer/affiliation whether you are permitted to submit Contributions if your employment contract or consultant contract stipulates that materials you create in the standards development activity are owned by your employer/affiliation
    - Determine whether there are regulatory restrictions on the material
    - Consult with parties to obtain consent for the submission if the material is under nondisclosure (Contributions cannot be marked as Confidential)
    - Request additional review if the material may include trade secrets or other material that should not be disclosed
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WHEN DO YOU NOT NEED PERMISSION, AUTHORIZATION, OR CONSENT?

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- **If the Contribution does not have copyright attached to it.**
  - Provide an explanation, and if possible, proof of this to the Working Group Chair, e.g., if copyright has expired.
- **If the Contribution has been placed in the Public Domain.**
  - Provide the location of any assertions that the material has been placed in the Public Domain.
- **If the Contribution was obtained subject to a license permitting its use.**
  - Submit the license to stds-copyright@ieee.org to determine if the use of the material is acceptable.
- **You do not need permission to access and show material that is publicly available (if lawful) without needing access rights or an account.**
  - Permission is still needed for inclusion in the draft standard.

5. IEEE SA Accepted PAR

Scope and Purpose for the currently submitted PAR

- **Scope:** This application guide applies to the ac indoor and outdoor high-voltage circuit breakers rated in accordance with the methods given in IEEE Std C37.04 and IEEE Std C37.04a, listed in IEEE Std C37.06(TM), and tested in accordance with IEEE Std C37.09 and IEEE Std C37.09a.1 Circuit breakers rated and manufactured to meet other standards should be applied in accordance with application procedures adapted to their specific ratings or applications.

- **Purpose:** The purpose of this document is to provide guidance for the application of high-voltage circuit breakers which are rated in accordance with IEEE Std C37.04 and IEEE Std C37.06 and which are tested in accordance with IEEE Std C37.09 and other related standards.

5. IEEE SA Accepted PAR

Need for the project

- Several related standards have been changed since the last revision and therefore an update of this standard is needed
- IEEE C37.04a with regard to capacitor current switching
- IEEE C37.09b with regard to harmonization between IEC and ANSI TRV (2 and 4 parameter)
- IEEE C37.015 shunt reactor switching
- Guidance for asymmetrical currents with regard to different time constants need to be given
- Several examples need to be updated and checked
- References need to be updated and checked for applicability

5. IEEE SA Accepted PAR

A. Some proposed additional content

- Several related standards have been changed since the last revision and therefore an update of this standard is needed (requirements and ratings have now been incorporated into one document - C37.06 has been incorporated within C37.04.)

- Growth of inverter-based generation in some distribution and transmission grids. New methods of calculating fault currents that take into account these constant current sources need to be recognized / approved

- Circuit breaker capabilities under user-specified operating voltage of 1.10 pu

- Application of high-voltage circuit breaker for generator synchronization
  - extended period of time in open position under 2 pu voltage
  - transients associated with disconnect switch operation

6. Anticipated Schedule

~~04/21/2021~~	~~PAR Study Group determined scope & purpose~~
~~10/6/2021~~	~~IEEE SA Accepted PAR Application~~
~~12/07/2021~~	~~IEEE NesCom meets to determine our fate~~
~~04/11/2022~~	~~1st working group meeting~~
10/17/2022	2nd working group meeting Burlington, VT
01/27/2023	3rd working group meeting VIRTUAL WebEx
04/ /2023	4th working group meeting Clearwater, FL
07/ /2023	5th working group meeting VIRTUAL WebEx
10/ /2023	6th working group meeting San Diego, CA
01/ /2024	7th working group meeting VIRTUAL WebEx
04/ /2024	8th working group meeting St. Petersburg, FL

6. Anticipated Schedule

07/ /2024	9th working group meeting VIRTUAL WebEx
10/ /2024	10th working group meeting Phoenix, AZ
01/ /2025	12th working group meeting VIRTUAL WebEx
04/ /2025	13th working group meeting Hilton Head, SC Submit draft to IEEE SA for initial ballot
07/ /2025	1st Comment resolution meeting VIRTUAL WebEx
10/ /2025	2nd Comment resolution meeting Reno, NV
01/ /2026	3rd Comment resolution meeting VIRTUAL WebEx
04/ /2026	4th Comment resolution meeting
07/ /2026	
10/ /2026	Submit completed document to RevCom

C37.010 Working Group

- Quorum Check
- Review of iMeet Central Workspace
- Approval of Minutes of last meeting

C37.010 Working Group

Discussion

How to handle updates to:

C37.06 references
&
References to other non-current standards

Call for volunteers

C37.010 Working Group

Reference Standards for IEEE PES C37.010 Working Group

Got It	Std Number	Year	Title
	C37.010-2016 & 1999		Application Guide for AC High-Voltage Circuit Breakers > 1000 Vac Rated on a Symmetrical Current Basis
	C37.04-2018		Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
	C37.04a-2003		Standard Rating Structure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis: Amendment 1 Capacitance Current Switching
	C37.06-2009 & 2018		Standard for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis–Preferred Ratings and Related Required Capabilities for Voltages Above 1000 V
	C37.09-2018		Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis
	C37.09a-2005		Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis- Amendment 1: Capacitance Current Switching
	C37.09b-2010		Standard Test Procedure for AC High-Voltage Circuit Breakers Rated on a Symmetrical Current Basis -- Amendment 2
	C37.011-2019		Guide for the Application of Transient Recovery Voltage for AC High-Voltage Circuit Breakers with Rated Maximum Voltage above 1000 V
	C37.012-2014		Guide for the Application of Capacitance Current Switching for AC High-Voltage Circuit Breakers Above 1000 V
	C37.017-2020		Standard for Bushings for High-Voltage [over 1000 V (ac)] Circuit Breakers and Gas-Insulated Switchgear
	C37.015-2017		Guide for the Application of Shunt Reactor Switching
	C37.20.2-2015		Standard for Metal-Clad Switchgear
	C37.24-2017		Guide for Evaluating the Effect of Solar Radiation on Outdoor Metal-Enclosed Switchgear
	C37.81-2017		Guide for Seismic Qualification of Class 1E Metal-Enclosed Power Switchgear Assemblies
	C37.100-1992 ??		Standard Definitions for Power Switchgear
	C37.100.1-2018 ?		Standard for Common Requirements for High-Voltage Power Switchgear Rated Above 1000 V
	C57.106-2015		Guide for Acceptance and Maintenance of Insulating Mineral Oil in Electrical Equipment
	ANSI C37.7-1960 ??		INTERRUPTING RATING FACTORS FOR RECLOSING SERVICE FOR AC HIGH-VOLTAGE CIRCUIT BREAKERS RATED ON A TOTAL CURRENT BASIS
	IEC 62271-100-2021		High-voltage switchgear and controlgear - Part 100: Alternating-current circuit-breakers

C37.010 - 2016 Table of Contents

Contents

IEEE PES Power & Energy Society®

IEEE

C37.010 Working Group

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C37.010

Impact of inverters on fault current calculation methods

Luke Collette

Craig Polchinski

Carl Schuetz

Marcus Young

IEEE
Advancing Technology for Humanity

Fault current guidance provided by AIEE and IEEE

Task at hand

- Since the middle 1950's determination of fault current values was supported by both IEC and IEEE
- The IEEE methodology presented in various C37 documents set the expectations for the determination of fault currents in the North American market through the 1970's: peak, asymmetrical and symmetrical
- Commercial fault current calculation programs have adopted this methodology in some form and this determination method has become the basis for interrupted current adequacy
  - Stated another way, C37.010 has been looked upon as the defining document to produce a system fault current value for use in CB interruption selection
- The methodology of C37.010 pertains to synchronous machines and not inverters
  - A methodology that includes inverters is needed, included in this revision of C37.010 and communicated to a broader audience due to the continued penetration of inverter based resources

Fault current determination guidance

Present method

- The calculated currents are based on the recommended method contained in C37.010
  - Fault currents determined by programs CAPE and ASPEN use an unloaded voltage magnitude that is user-defined
  - Sub-transient machine reactance values are used
  - A separate network reduction of reactances and resistances is performed
  - Decrement factors used by CAPE use a curve fitting algorithm based on the decrement curves found in C37.010 Tables 7,8,9. It multiplies the calculated factors by the symmetric current to get the adjusted fault current for comparison to the rated CB current

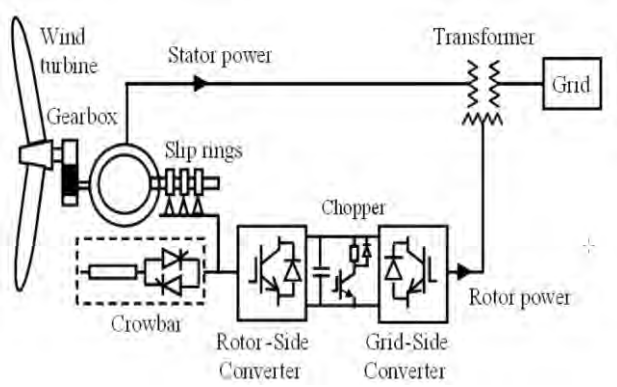
Note: the use of an unloaded system permits the simplifying assumption that all source voltages are equal and in phase

From the view point of the fault the different contributions are assumed to be in-phase and the circuit X/R ratio determines the fault current asymmetry

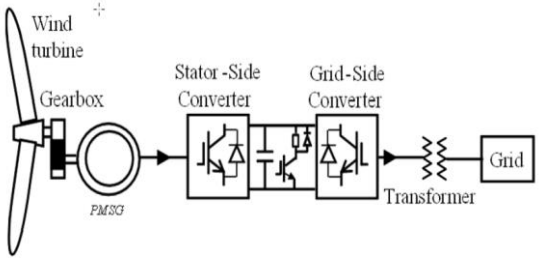
Types of inverters

Impact of inverters on fault current from PSRC technical report PES-TR 78

- Wind Turbine (WT) Type III & IV / Voltage Sourced Converters (VSC)
  - Type III WT uses a back to back converter tied to the rotor and grid, the stator is connected directly to the grid



  - Type IV WT uses two converters that isolate it from the grid (stator-side and grid-side)
  - The VSC may have two or more levels of electronic modules and a power transformer between the inverter and system



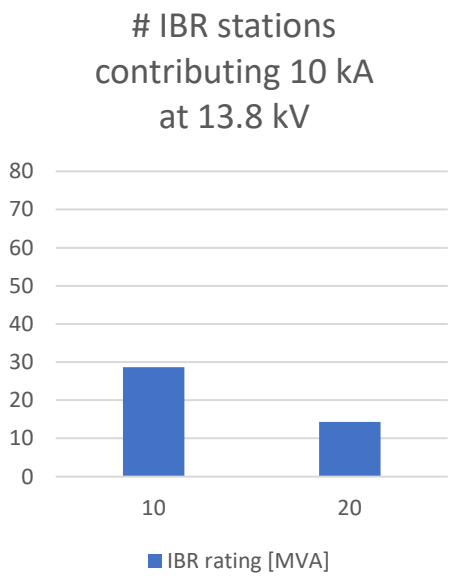
Types of inverters

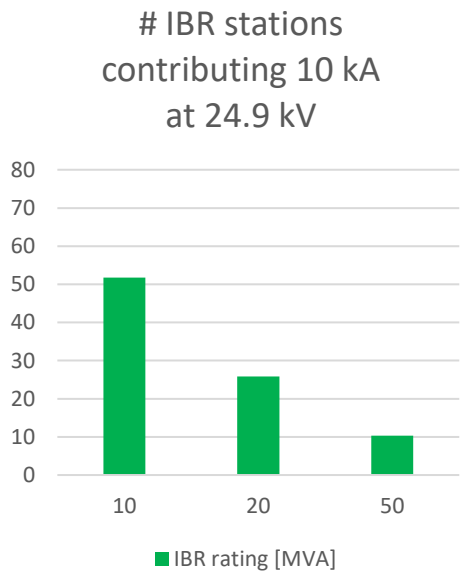
Inverter control from PES-TR 78

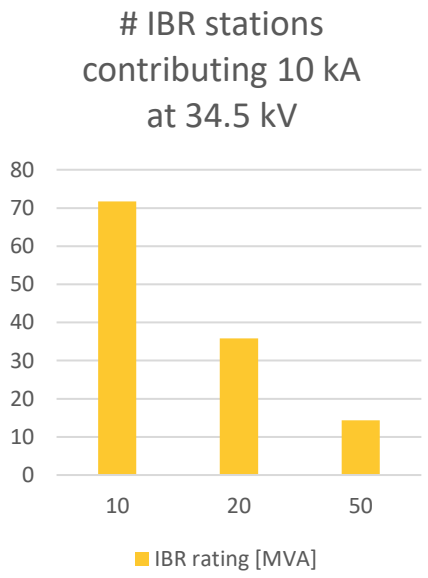
- WT type III / IV and VSC inverters have the capability to quickly (micro-second timeframe) change their current output based on bus voltage data
- Available fault current is usually between 1.1 – 1.2 p.u. of rated output current
- The rated current may be split into different phasor groups representing the control settings (real power / reactive power / combination of both)
  - Power, voltages and current are often expressed in the dq reference frame
  - The controller can often be set to have over-riding functions such as high reactive power injection when the terminal voltage is abnormally low, say for a fault

Inverter Based Resources Penetration

Number of specific size IBR contributing 10 kA fault current at a system voltage level







Inverter Based Resources Penetration

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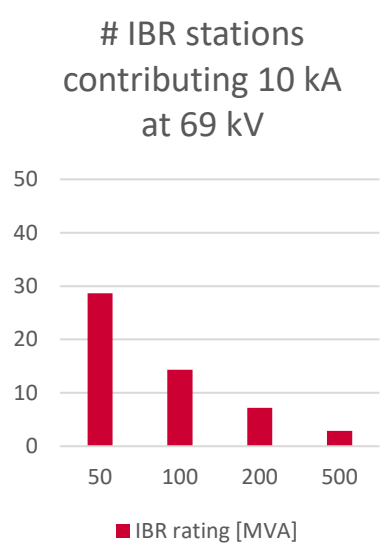

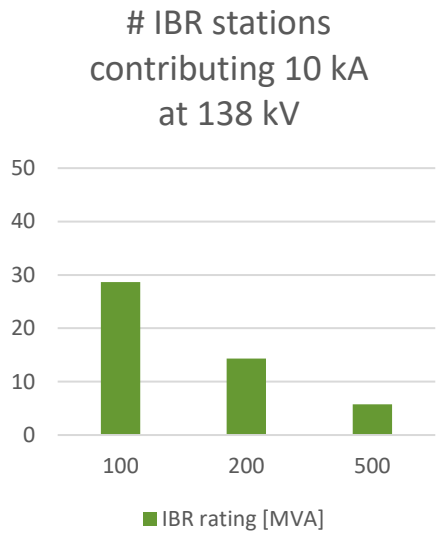

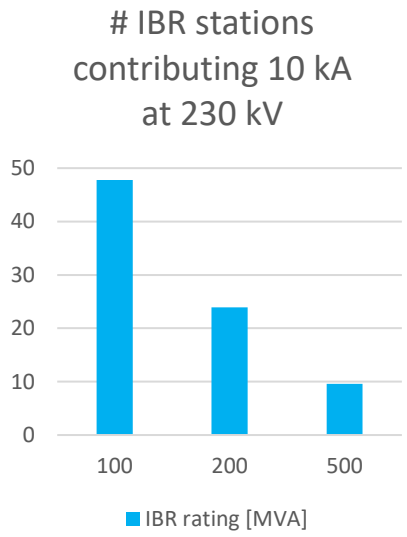

Fault current guidance from C37.010

Revising the present methodology

- It is desired to define a methodology in which to calculate the peak and interrupted current values that has a level of conservatism equal to the present methodology
  - Peak current determines the suitability to close and latch rating
  - Contact Parting Time (1/2 cycle + CB contact part) current determines the suitability of the interrupting current rating
- The results of this methodology should apply to the following:
  - Manual calculations
  - Fault current calculation software
  - Electro-Magnetic Transient software

Fault current guidance

Revising the present methodology

- The revised methodology is envisioned to necessitate a determination of what the inverter controller response will be
- This determination is necessary due to the inverter operation as a voltage-controlled current source
- If the use of decrement curves is retained, revised / additional curves may be needed based on the transient current produced by the inverter when a fault is experienced
- Revised text and examples will be needed
- Partnering with the Power System Relaying and Control Committee would be beneficial as they have performed much research on inverters to date

Fault current guidance

Development of an action plan - call for volunteers

- Collection and review of commercial software program methods to calculate peak current and interrupted current
- Asymmetric current calculation methods during interruption as a function of IBG penetration
- - Consideration of IBG controller settings
- - Canvas industry to see what future expected levels of IBG penetration are for MV / HV / EHV systems
- Peak current (first major loop) calculation method for determining close & latch rating as a function of IBG penetration

Fault current guidance

Development of an action plan - call for volunteers

- Tabulation of fault ride-through settings of users (need for an industry survey)
- Reach out to industry experts for assistance in understanding how the inverters work

C37.010 Working Group

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webex by CISCO

Next meeting will be an On-Line WebEx Meeting

January 27, 2023
13:00 EST or 11:00 Phoenix Time

Would someone like to make a motion to adjourn?

Our Next in-person Meeting Is Scheduled to be at:

Sheraton Sand Key Resort, Clearwater, Florida

April 2023

Monday, October 17, 2022

Attendance List

Breakout	Timestamp	Name	Email	Affiliation	Membership
C37.010 \	10/17/2022 08:13	Aristizabal, Mauricio	m.aristizabal@ieee.org	Hitachi Energy USA	
C37.010 \	10/17/2022 09:15	Bryant, Craig	craig.bryant@duke-energy.com	Duke Energy Corporation	REQUESTED MEMBERSHIP
C37.010 \	10/17/2022 08:13	Chovanec, Andrew	achovanec@hotmail.com	G&W Electric Company	X
C37.010 \	10/17/2022 08:09	Christian, Michael	michael.b.christian@us.abb.com	ABB Ltd	X
C37.010 \	10/17/2022 07:54	Collette, Lucas	lucas.collette@ieee.org	Duquesne Light Co.	X
C37.010 \	10/17/2022 08:10	Crawford, Michael	michaelfcrawford@ieee.org	Mitsubishi Electric Power Products, Inc. (MEPPI)	
C37.010 \	10/17/2022 08:25	Cunningham, Jason	j.cunningham@southernstatesllc.com	Southern States LLC	
C37.010 \	10/17/2022 08:55	Di Lillo, Patrick	dililop@coned.com	Consolidated Edison Co. of NY, Inc.	X
C37.010 \	10/17/2022 08:16	Hanna, Robert	rhanna@jstpower.com	JST Power Equipment Inc	
C37.010 \	10/17/2022 08:10	Heinrich, Christian	heinrich.falkensee@t-online.de	Siemens AG	
C37.010 \	10/17/2022 08:01	Hensberger, Jeremy	jeremy.hensberger@meppi.com	MEPPI	X
C37.010 \	10/17/2022 08:26	Hermosillo, Victor	victor.hermosillo@ge.com	GE Grid Solutions	REQUESTED MEMBERSHIP
C37.010 \	10/17/2022 08:17	Hunter, Jennifer	jennifer.hunter@meppi.com	MEPPI-Warrendale Pa	
C37.010 \	10/17/2022 08:11	Irwin, Todd	todd.irwin@ieee.org	GE Grid Solutions	
C37.010 \	10/17/2022 08:10	Jarnigan, Christopher	chris_jarnigan@yahoo.com	southern company/ southern nuclear	X
C37.010 \	10/17/2022 08:23	Jensen, Darin	darin.j@mas.meidensha.com	Meiden America Switchgear	
C37.010 \	10/17/2022 07:19	Keels, Thomas	thomasakeels@ieee.org	kEElectric Engineering, PLLC	
C37.010 \	10/17/2022 08:40	Kurinko, Carl	carl.msee@gmail.com	Hitachi Energy	
C37.010 \	10/17/2022 08:13	Marshall, Vincent	vamarsha@southernco.com	southern company/ southern nuclear	
C37.010 \	10/17/2022 08:10	May, Steven	sgmay@southernco.com	Southern Company Services	REQUESTED MEMBERSHIP
C37.010 \	10/17/2022 10:57	Mc Cord, Neil	neil.mccord@ieee.org	KEC Precision LLC	
C37.010 \	10/17/2022 08:17	Mitchell, David	david.k.mitchell@ieee.org	Southern States LLC	
C37.010 \	10/17/2022 08:16	Natale, Anthony	tonatale@gmail.com	HICO America	
C37.010 \	10/17/2022 08:13	Schiffbauer, Daniel	daniel.schiffbauer@toshiba.com	Toshiba International Corporation	
C37.010 \	10/17/2022 08:09	Schuetz, Carl	cschuetz@atcllc.com	American Transmission Company	X
C37.010 \	10/17/2022 08:11	Scott, Jeffrey	jscott3@ameren.com	Ameren Services	X
C37.010 \	10/17/2022 08:11	Skidmore, Michael	mlskidmore@aep.com	American Electric Power (AEP)	X
C37.010 \	10/17/2022 08:13	Smith, R Kirkland	r.kirkland.smith@ieee.org	IEEE member / Self Employed	
C37.010 \	10/17/2022 08:14	Steigerwalt, Donald	don.steigerwalt@duke-energy.com	Duke Energy Corporation	X
C37.010 \	10/17/2022 08:12	Usner, Joseph	jausner@aep.com	AEP	
C37.010 \	10/17/2022 08:08	Webb, John	jcwebb@ieee.org	ABB Ltd	X
C37.010 \	10/17/2022 08:09	Weisker, Jan	jan.weisker@siemens-energy.com	Siemens Energy	X
C37.010 \	10/17/2022 10:21	York, Richard	richyork3560@gmail.com	Mitsubishi Electric Corporation	X
C37.010 \	10/17/2022 08:12	Young, Marcus	s_mayoung@hotmail.com	Mitsubishi Electric Power Products, Inc.	X
C37.010 \	10/17/2022 08:09	Zaharko, Samuel	samuel.zaharko@meppi.com	Mitsubishi Electric Corporation	X

Monday, October 17, 2022

Attendance List

C37.010 \	Excused	Caverly, David		Trench Ltd.	
C37.010 \	Excused	Livshitz, Albert	albertliv@gmail.com	Qualus Services	
	Manually Added	Toups,Vernon	vernon.toups@siemens-energy.com	Siemens Energy	X
	Manually Added	Ricciuti, Anthony	atricciuti@hotmail.com	Eaton	X
	Manually Added	Orosz, Miklos	oroszm@bellsouth.net	Circuit Breaker Technology & Support LLC	X
	Manually Added	Hasnaoui, Nadia	NADIA.HASNAOUI@GE.COM	GE Grid Solutions	
	Manually Added	Rexroad, Aaron	aaronmrexroad@gmail.com	Meiden America Switchgear inc.	

43 attendees

19 members

24 guests