

## **WG C37.012a San Diego, CA 2019 08 10**

### Minutes of Meeting

WG: C37.012a Guide for the Application of Capacitance Current Switching for AC High-Voltage Circuit Breakers Above 1000 V Amendment Changing the Capacitive Inrush/Outrush Limitations of Switchgear

Chair: Roy Alexander

Vice-Chair: Brian Roberts

Secretary/Acting Chair: Luke Collette

Tuesday October 8th, 2019 (8:00-9:45 AM)

Location: San Diego, CA

Participants: 13 Members

15 Guests

### Call to Order

Acting chair called to order and presented agenda.

### Introduction by the Chair

The chair was unable to attend, so the meeting was run by the acting chair. Meeting was kicked off with the active chair describing the purpose of the amendment.

### Introductions of members and guests

Introductions performed and attendance sheet circulated.

### Call for Patents

Patent and copyright policy slides presented. No Patent claims identified.

### Approval of Minutes from 29-Apr-2019

At the beginning of the meeting there did not appear to be quorum, so the meeting was going to primarily be discussion. However, once the attendance sheet was circulated it was determined that quorum did exist.

The acting chair reviewed minutes from the previous meeting for approval. Motion by a WG member, Second by another WG member. All voted in favor, minutes approved.

### Discussion of Draft 1.5

The acting chair presented the primary technical change to the draft (Clause 4.3.3) which proposes guidance to users that inrush currents are acceptable as long as the peak is within preferred ratings in C37.04 and the product of the peak and frequency are within four times the product of the peak and frequency of the tested values per C37.04.

A comment was made that some have performed testing on capacitor switching devices up to 90 kHz with no concerns. For SF6 devices with tulip contacts, the frequency has no impact on the interrupter.

The acting chair mentions recent work by CIGRE WG A3.38 which seems to be in agreement that the impact of frequency can be de-emphasized, however, no documents were published yet to the knowledge of the Working Group.

Comments were made regarding some editorial changes such as capitalization of units and typographical errors. Also, references to C37.04, C37.06, and C37.09 all need updated. These will be addressed in the next draft and were not discussed in detail during the meeting.

A comment was made regarding the applicability of the proposed changes to vacuum and gas interrupters only. The Introduction of the document states this, but there is a concern that once the Amendment is adopted into the main document the Introduction may be lost. It was recommended to add language within the document that discusses the introduction material.

How do we state this Amendment doesn't apply to oil breakers without being technology specific? Suggested to not delete text from document, but add a paragraph to existing text so that nothing gets lost and creates problems with those who have existing oil breakers.

The language in C37.04 related to outrush current was reviewed to determine if the Amendment is consistent. Specifically, Notes (1) and (7) for Table 11 in C37.04-2018 were reviewed. In C37.04 the Notes for Table 11 do not differentiate between oil, gas, or vacuum technologies. Instead the outrush limits are defined by Class C0, C1, or C2 capability.

A comment was made about the use of strikethrough when changing numbers such as going from 4% to 24% in Clause 6.1.1. It was suggested to include the word before to make it easier to see the change. For example, mark as ~~approximately 4%~~ approximately 24%. Similar suggestion when changing C37.06 to C37.04.

In Clause 9.7, it was suggested to change "Class C0 may be acceptable for distribution systems 23 kV and below and for applications where capacitive current is infrequently switched and restrikes are not a concern." to "Class C0 may be acceptable where restrikes are not a concern."

A comment was made that the section on switching shunt compensated lines would be more appropriate in C37.015 which is the shunt reactor switching application guide. The general consensus from the WG was that since the breakers of concern are those switching the line/cable, it is appropriate to stay in C37.012.

A comment was made that the testing performed to demonstrate frequency doesn't impact SF6 breakers should be referenced. The WG did not know if the paper would be published in time for the Amendment to include the reference.

A note should be added to Table 3 which compares mitigation solutions to state TLI can cause TRV concerns.

A comment was made regarding the use of the term "Controlled Closing" versus "Synchronous-Close Control." It was stated that some confuse the term "Synchronous-Close Control" with generation or system synchronization rather than capacitor switching.

Clause 9.14.2 needs to state allowing outrush current up to close and latch is only applicable to Class C1 and C2 breakers.

It was suggested to change the use of EMTP to a non-specific software. Suggestions included digital simulation program or electromagnetic transients type software.

There was a comment regarding the introduction of the term shock waves. Since there is no definition or description provided, users may be confused with the terminology. It was suggested that the paragraph introducing shock waves in 9.11.2.3 is re-done to include background as to what is meant by shock wave and how it can be destructive in incompressible dielectric mediums. A suggestion was made to add references if possible.

#### Next Steps

It was determined during the meeting that because of the amount of edits needed to the current draft, a vote on sending the document to ballot and the formation of a comment resolution group will be delayed until the working group can review the next draft.

A revised draft of C37.012a will be circulated within a few weeks following this meeting, with the intention to have an electronic vote among the working group to determine if the draft is ready to be sent to ballot.

#### Adjournment

Acting chair adjourned the meeting at 9:45 AM.

Lucas Collette  
Secretary C37.012a

# IEEE PES Switchgear Committee

## HVCB C37.012 - Meeting Roster

Place / Date of meeting :

SAN DIEGO / 10/8/19

| Initial to denote attendance | Last name  | First name  | Company Name                            | Role       | Request Membership |
|------------------------------|------------|-------------|---|------------|--------------------|
|                              | Alexander  | Roy         | RWA Engineering                         | Chair      |                    |
|                              | Bhatt      | Gautami     | Bechtel OGC                             | Guest      |                    |
|                              | Bosma      | Anne        | ABB AB                                  | Member     |                    |
|                              | Boulus     | Michael     | PSE&G                                   | Guest      |                    |
|                              | Brogdon    | Jeffrey     | Georgia Transmission                    | Guest      |                    |
| <del>JAS</del>               | Bufl       | Arben       | Hitachi T&D Solutions, Inc.             | Member     | <del>JAS</del>     |
|                              | Caverly    | David       | Trench Ltd.                             | Guest      | <del>JAS</del>     |
|                              | Chovanec   | Andrew      | GE Power                                | Guest      |                    |
| M/LLC<br>LPL                 | Christian  | Michael     | ABB                                     | Member     |                    |
|                              | Collette   | Lucas       | Duquesne Light                          | Secretary  |                    |
|                              | Cunningham | Jason       | Southern States, LLC                    | Member     |                    |
|                              | Dullni     | Edgar       | retired                                 | Guest      |                    |
|                              | Eftink     | Emily       | Burns & McDonnell                       | Guest      |                    |
| JK                           | Frazier    | Raymond     | Ameren                                  | Member     |                    |
| JTH                          | Hall       | John        | Tennessee Valley Authority              | Member     |                    |
|                              | Heiermeier | Helmut      | ABB                                     | Member     |                    |
|                              | Hensberger | Jeremy      | Mitsubishi Electric Power Products Inc. | Guest      |                    |
|                              | Hermosillo | Victor      | GE Grid Solutions                       | Member     |                    |
|                              | Hester     | Edward      | Entergy                                 | Member     |                    |
|                              | Hunter     | Jennifer    | MEPPI                                   | Guest      |                    |
|                              | Hutchins   | Roy         | Southern Company Services               | Member     |                    |
|                              | Irwin      | Todd        | GE Grid Solutions                       | Guest      |                    |
|                              | Jarnigan   | Christopher | Southern Company Services               | Guest      |                    |
|                              | Kim        | SangTae     | HICO/HYOSUNG                            | Guest      |                    |
|                              | LEE        | CHANG HOON  | HYOSUNG Heavy industries                | Guest      |                    |
|                              | Mannarino  | Antonio     | PSE&G                                   | Guest      |                    |
| VM                           | Marshall   | Vincent     | Southern Company Services               | Guest      |                    |
|                              | Marx       | Benjamin    | Sargent and Lundy                       | Guest      |                    |
|                              | Mason      | Douglas     | ComEd                                   | Guest      |                    |
| SGL                          | May        | Steven      | Southern Company                        | Guest      | SEM                |
|                              | McCord     | Neil        | KEC Precision                           | Member     | MM                 |
|                              | Mitchell   | Dave        | Mitch and Associates                    | Guest      | DKM                |
| BJP                          | Pellerito  | Thomas      | DTE Energy                              | Guest      |                    |
| CHA                          | Polchinski | Craig       | MEPPI                                   | Guest      | CHA                |
|                              | Ricciuti   | Anthony     | Eaton Corporation                       | Guest      |                    |
|                              | Rich       | Bobby       | Dominion Virginia Power                 | Guest      |                    |
| BR                           | Roberts    | Brian       | Southern States, LLC                    | Vice-Chair | BR                 |
|                              | Rogers     | Jon         | Siemens Energy, Inc                     | Member     |                    |
|                              | Rostron    | Joe         | Southern States LLC                     | Guest      |                    |

# IEEE PES Switchgear Committee

## HVCB C37.012 - Meeting Roster

Place / Date of meeting : \_\_\_\_\_

| Initial to denote attendance | Last name   | First name    | Company Name                             | Role   | Request Membership |
|------------------------------|-------------|---------------|--|--------|--------------------|
|                              | Salinas     | Alex          | Director of Operations                   | Guest  |                    |
| CCS                          | Schuetz     | Carl          | American Transmission Company (ATC)      | Member |                    |
|                              | Shinde      | Sushil        | ABB Inc.                                 | Member |                    |
|                              | Sicker      | Robert        | FirstEnergy Corp                         | Guest  |                    |
| MEL                          | Skidmore    | Michael       | AEP                                      | Member |                    |
|                              | Smith       | Robert        | Retired                                  | Guest  |                    |
|                              | Steigerwalt | Don           | Duke Energy                              | Guest  |                    |
| TD                           | Sullivan    | Dustin        | Hubbell Power Systems                    | Guest  |                    |
|                              | Toups       | Vernon        | Siemens                                  | Guest  |                    |
|                              | Venna       | Karthik Reddy | Siemens AG                               | Guest  |                    |
|                              | Vonfeldt    | Nick          | Ameren Missouri                          | Guest  |                    |
| <del>SW</del>                | Webb        | John          | ABB                                      | Member |                    |
| CW                           | Weeks       | Casey         | Siemens Energy                           | Member |                    |
| JL                           | Weisker     | Jan           | Siemens AG                               | Member |                    |
|                              | York        | Richard       | Mitsubishi Electric Power Products Inc.  | Guest  |                    |
| MS                           | Young       | Marcus        | Mitsubishi Electric Power Products, Inc. | Guest  | Member             |
|                              | Zhang       | Wei           | Hitachi T&D Solutions, Inc.              | Member |                    |
|                              | Zhong       | Jim           | American Transmission Company            | Member |                    |
| XZ                           | Zhu         | Xi            | GE Energy Management                     | Guest  |                    |
|                              | te Paske    | Henk          | KEMA Netherlands                         | Guest  |                    |
| JV                           | van de Ligt | James         | CANA High Voltage Ltd.                   | Member |                    |

|     |          |           |                        |       |         |
|-----|----------|-----------|------------------------|-------|---------|
| SS  | Lanning  | Scott     | J+C Electric           | guest |         |
| SR  | Kaminski | John      | Siemens                | Guest |         |
| RR  | FENNELL  | BOUCE     | NASHVILLE ELECTRIC SUP | Guest |         |
| HYL | LIU      | HUA YING  | SCE                    | Guest | member. |
| ET  | TOOIS    | ELIZABETH | MEPPI                  |       |         |
| NR  | Fender   | Karl      | SSLLC                  | Guest |         |