Meeting Minutes

C37.01 Standard for HVDC Circuit Breakers

Chair: Joanne Hu

Secretary: Steven Chen

Time: 8:00 am – 9:45 am, April 19, 2021

Location: Online

Participants: 43 participants, including 19 members and 24 guests

1. Agenda and Topics

- Introduction of members and guests
- IEEE SA patent/Copyright/Guidelines
- Approval of minutes of previous meeting
- IEC status
- Review document PC37.01 D2
- Next steps

2. Introduction

Welcome and introduction by Steven Chen filling in for Joanne Hu, Chair of the WG. The roster is attached in the end of this meeting minutes as Attachment 1.

3. Review of IEEE SA Patent and Copyright Policies

IEEE SA Patent and copyright policies were presented and reviewed.
No patents or copyright claims were identified.

4. Approval of Minutes of Previous meeting

Approval of Meeting Minutes of The Last Meeting Held Online on October 5, 2020.
The meeting minutes was sent to all members and guests via e-mail and was posted on the IEEE PES Switchgear Committee website.
There were no comments received.

5. IEC Status

IEC Technical Committee 17 has five HVDC switching device projects in various stages of development. Some of these documents contain useful data that can be used to supplement the content or assist in development with this work.

6. Draft Review and Discussion

The newest content of the differing HVDC CB types was reviewed; active current injection, power electronic and hybrid (mechanical and power electronic). After the introduction a short

discussion and further explanation by the Secretary ensued regarding the current interruption process of the various interrupting technologies.

The content of Chapter 10 was then reviewed (DC Breaker Applications) and concluded with a proposal that the examples of that chapter be referenced when continuing the work in the Rating chapter.

The working group (WG) discussed the need for a survey to determine what ratings would be needed/desired. The Secretary commented that going out to the industry for a survey would have the benefit of providing additional data for consideration. After this comment was made the Secretary shared that additional reference data has been collected for consideration but has not been shared at this time.

A comment was received from one attendee that in Section 3 Definitions - Concept 2, pg.18 the interrupting technology shown was developed in 2012 and may not still be an applicable referenced to be included in this document. Another commenter thought the scheme is presently in service in China.

Section 7, DC CB modelling was reviewed next. Guidance to develop simple and detailed models of a DCB is given. Guidance for modelling is provided applicable to any technology (hybrid or static). The development to date of the simple and detailed models was described.

With active current injection model capacitance is important because it could resonate with cable capacitance. The detailed model requires simulation timestep down to micro-seconds due to LC circuit response of 1-3 kHz.

Clause 7.5 was reviewed last. Inclusion of an inductor in the various models was discussed. Some commenters opinioned that the inductor should be in, others it would depend on what ratings are included. Time values of switch operation were questioned but several commenters thought the values used in the document to date were adequate.

A comment was made that trip signals usually go from low to high, but the presenter explained the gate signal that controls the power electronic switch goes from high to low. The presenter agreed to provide further explanation of trip signals. A further explanation was made that the modelling software represents an electronic switch in an on state by a logic 1 and in an open state by a logic 0.

Next steps for document development include detailed work in the following sections: Ratings, Technical Requirements, Testing. Small groups will be formed to draft these sections and the Secretary requesting individuals interested in contributing to volunteer.

7. Adjourn

Attachment 1 - Roster

Last Name	First Name	Affiliation	Role	Attendance
Ayers	Roy	Nashville Electric Service	Guest	√
Balasubramanian	Ganesh	Eaton Corporation	Guest	
Bannink	Herman	KEMA Netherlands	Guest	√
Bisewski	Bruno	RBJ Engineering Corp	Member	√
Bosma	Anne	Hitachi ABB, Sweden	Guest	
Boyce	Russell	Eaton Corporation	Member	
Byron	Eldridge	Schneider Electric	Member	√
Cary	Steve		Member	√
Caverly	David	Trench Ltd.	Guest	√
Chen	Steven	Eaton Corporation	Secretary	√
Chhabra	Mohit	S&C Electric	Guest	
Christian	Michael	ABB	Guest	√
Collette	Luke	Duquesne Light Co.	Guest	√
Cosby	Bianca	San Diego Gas & Electric	Guest	
Di Michele	Federico	CESI	Member	√
Edwards	Doug	Siemens, Wendell, NC	Guest	
Ekpoudom	Chris	Southern States	Guest	√
Gao	Chong	GEIRI	Member	
Ghassemi	Mona	Virginia Tech	Member	
Heinrich	Christian	Siemens AG	Member	√
Hensberger	Jeremy	Mitsubishi Electric Power Products	Guest	
Hermosillo	Victor	GE Grid Solutions	Member	√
Hu	Joanne	RBJ Engineering	Chair	
Hunter	Jennifer	Mitsubishi Electric Power Products	Guest	√
Hurst	Bill	GE Renewable Energy	Guest	√
Jagadeesan	Bharat	Southern States, LLC	Member	
Jovcic	Dragan	University of Aberdeen, UK	Member	√
Kaminski	John	Siemens	Guest	√
Leufkens	Paul	Power Projects Leufkens	Member	√
Li	Wangpei	Eaton Corporation	Guest	√
Ling	Jane	GE Renewable Energy	Member	√
Liu	Hua Ying	Southern California Edison	Guest	
Lopez	Leo	WIKA Instruments	Guest	√
Maleki	Zeinab			√
Marshall	Vincent	Southern Company	Guest	√

Marx	Benjamin	Sargent & Lundy	Guest	
May	Steve	Southern Company Service	Guest	√
Mehraeen	Shahab	Louisiana State University	Member	
Novak	Pavel	Schneider Electric	Guest	√
Palazzo	Mirko	ABB	Guest	
Pellerito	Thomas	DTE Energy	Guest	√
Peterson	Andrew	ABB	Guest	
Phan	Lise	Pacific Gas and Electric Company	Member	
Polchinski	Craig	Mitsubishi Electric Power Products	Guest	√
Razi-Kazemi	Ali	K. N. Toosi University of Technology	Guest	√
Riffe	Dave	Westinghouse Electric Company	Guest	
Ricciuti	Anthony	Eaton Corporation	Guest	
Schuetz	Carl	American Transmission Company	Member	√
Sharma	Devki	Entergy	Guest	√
Shen	John	Illinois Institute of Technology	Member	√
Skidmore	Mike	AEP	Guest	√
Stage	James	Dominion Energy	Member	√
Swing	Donnie		Guest	√
Thomas	Christo		Guest	√
Wang	Pei	Manitoba Hydro	Member	√
Ward	Jeff	Doble Engineering Company	Member	√
Webb	John	ABB	Member	√
Weisker	Jan	Siemens AG	Guest	
Woodyard	Terry	Siemens Industry	Guest	
Yu	Li	Eaton Corporation	Member	√
Yuan	Zhao	Huazhong University of S&T	Member	
Zhang	Sheng	GEIRI	Member	
Zhang	Wei	Hitachi T&D Solutions, Inc	Member	√
Zhou	Xin	Eaton	Guest	√
Zhu	Xi	GE Renewable Energy	Member	√
Zia	Danish	UL LLC	Guest	√