

*Minutes for HVDC Switches
April 18, 2023
Spring 2023 Meeting – Clearwater*

- The working group met for one session on April 18th.
- 29 participants were in attendance. 7 of 11 members and 1 Ex-Officio Member were in attendance. See the attached attendance roster.
- Attendees introduced themselves and stated their affiliations.
- WG Chair Bill Hurst reviewed the Patent and SA Copyright slides with working group.
 - No participants stated any patent conflicts with the WG.
- WG Chair Bill Hurst reviewed minutes from the Fall 2022 meeting.
 - WG Chair confirmed Pete Kowalik and Adam Voyles as members of the WG.
 - Modification to the PAR- Standard description currently states “Rated Above 1000 Vdc” and the modification is to change the description to “Rated Above 3200 Vdc” to align with HV Vdc circuit breaker standard (C37.01).
 - Carl Reigart asked where the division at 3200V is defined.
 - C37.100.5 defines that break at 3200Vdc.
 - PAR revision to be voted on in the HV Switch Subcommittee meeting on 4/19 as a recommendation to the subcommittee
 - WG Chair mentioned that this document may need PAR extension, which currently ends in 2024. Doug Edwards recommended not filing for the extension until Spring 2024 and provide reason of why (% completion, how often we meet, hurdles, actions to complete document). Doug recommends asking for more than 1 year to provide ample time.
- WG Chair Bill Hurst shared Draft 4 of document with working group.
 - Noted that the changes highlighted in yellow are modifications to the AC standard to adapt to DC.
 - Primary focus for 4/18 meeting is ratings. Potential that distribution ratings can be discarded. Indoor and Outdoor applications need to be addressed and included.
 - Section 5.3.1 Voltage ratings. WG Chair proposing to use Table 4 from the HVDC Circuit breaker standard. Two groupings of <100kV and >100kV.
 - Ranges I and II that align with IEC HVDC ratings.
 - Question from WG: What about the voltage between 3200V and 6000V since Table 4 starts at 6kV? IEC has also not included <6kV. Current gap also in breaker standard with no resolution. Note 2 of table states that the numbers are rounded to the next highest number.
 - Chair proposes that the withstand voltage column and lightning impulse voltage column will state the phase to ground value and add additional columns showing the insulation value at +10%
 - Comment from WG: Need to test + and – values >> Include in testing section
 - Range II (>100kV)- Max voltage listed at 5% over the nominal voltage; Similar changes for the withstand voltage, lightning impulse, switching impulse
 - Riyad (GE) asked by WG Chair to present an example of Switching Impulse presentation (real project example) for WG understanding. How to test for it in the lab and how differs from AC.

- Comment from WG: Get an expert from IEC or Siemens or Hitachi to discuss DC switchgear and applications with us (in general).
- Missing the bias voltage for the switching impulse. WG reviewed IEC 62271-5. Also Note 5 reviewed of Table in IEC.
 - WG Chair showed example circuit of different DC switch types.
- Remove the sections from AC standard that refers to distribution. Covered in this document by two separate voltage ranges instead of by the distribution and substation split.
- Indoor vs. Outdoor: Address as a subgroup once Table 4 is addressed. Pending question, will indoor application require different ratings?
 - Wet vs Dry withstand testing: Both are necessary for outdoor application.
 - Dew withstand only required for indoor switches. Valve hall, for example. Controlled vs. uncontrolled environments also.
- Current Ratings: Overcurrent conditions that are established for the AC switches applies for the DC switches, no need to change at this time.
- Short Circuit Conditions: Peak withstand could be a concern. Values are likely project specific.
- WG Chair proposed to have different groups looking at voltage, current, and >> reference published Cigre documents and other references. No volunteers, so will continue to address as a working group.
- Action Items for Fall 2023 meeting discussed. See list below.
- Riyadh Kechroud requested WG membership.
- Carl Reigart requested to be a guest.
- Meeting adjourned at 11:53 am on April 18th.

Action Items for Fall 2023 Meeting:

- WG Vice Chair to schedule members meeting before Fall 2023 meeting to work on the voltage, overvoltage, current, and over current ratings. WG to present rating tables at Fall 2023 meeting.
- Riyadh (GE) to prepare presentation on example of Switching Impulse.
- Send instructions for getting to iMeet location to WG members. Request permission to add additional Cigre documents.

Laura Reid
WG Vice Chair

WG PC37.30.7 S23 Attendance

Last Name	First Name	Company	Role	4/18/2023
Andris	Samuel	Kema Labs	Guest	
Andreyo	Joe	Southern States LLC	Guest	X
Allingham	Edward	Hydro One	Guest	X
Barber	Gordon	Hubbell Power Systems	Guest	
Berner	Brian	Power Grid Comp	Guest	X
Blake	Jacob	Hubbell Power Systems	Member	X
Boles	Brett	Southern Company	Member	X
Bisewski	Bruno	RBJ Engineering, Corp.	Member	
Chen	Steven	Eaton	Member	
Chhabra	Mohit	S&C Electric	Guest	
Cook	Tim	Pascor Atlantic	Guest	X
Davies	Stacey	Siemens	Guest	X
Diallo	Boubacar	Southern States LLC	Guest	X
Donahue	Steven	Royal Switchgear	Guest	X
Edwards	Doug	Siemens	Ex-Officio Member	X
Ekpoudom	Assian (Chris)	Southern States LLC	Guest	
French	Chris	Beta Engineering	Guest	X
Flemming	Brennen	Hubbell Power Systems	Guest	
Flowers	Keith	Siemens	Guest	
Gill	Juan	Southern States LLC	Guest	X
Gilmer	David	TCI	Guest	X
Guzman	Francisco	Southern California Edison	Guest	
Harley	John	FirstPower Group LLC	Guest	
Heinrich	Christian	Siemens	Guest	
Hoss	Danny	Southern States LLC	Member	X
Hu	Jingxuan (Joanne)	RBJ Engineering, Corp.	Guest	
Hurst	Bill	GE Renewables	Chair	X
Jasinski	Joe	ITC Holdings Corp	Guest	
Johnson	David	HVCB	Guest	
Kaminski	John	Siemens Industry	Member	X
Kechroud	Riyad	GE Grid Solutions	Guest	X
Kinner	Robert	FirstPower Group LLC	Guest	
Kowalik	Pete	Cleveland/Price Inc.	Member	X
Krause	Dwight	Black & Veatch	Guest	X
Mapp	Peter	GE Renewables	Guest	X
Miller	Anne	TCI	Guest	X
Moore	Jeremy	Pascor Atlantic	Guest	
Morton	Christopher	Powertech Labs Inc.	Guest	
Perrin	Damian	Entergy	Guest	
Reid	Laura	Hubbell Power Systems	Vice Chair	X

Reigart	Carl	Retired	Guest	X
Ross	Rob	Cleveland/Price Inc.	Guest	X
Rowe	Ryan	TCI	Guest	X
Savolyak	Victor	Kema Labs	Guest	
Solanki	Lokesh	ABB	Guest	X
Stella	Eros	GE Renewables	Guest	
Swing	Donnie	Powell Industries	Guest	
Thompson	Truett	Siemens	Guest	X
Usner	Joseph	AEP	Guest	
Voyles	Adam	Ameren	Member	X
Weishuhn	Will	ABB	Guest	X
Yu	Li	Eaton	Guest	
Zia	Danish	Underwriters Laboratory LLC	Guest	
Zhang	Wei	Southern Company	Guest	