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IEC SC22F — Power electronics for electrical transmission and distribution systems (2020 -2021)

IEC SC22F Power electronics for electrical T&D systems — General information

- **Established in 1970**

Converters for high-voltage direct current (HVDC) power transmission

- **Renamed in 1985**

Power electronics for electrical transmission and distribution systems

- **Secretariat — Russian Federation**

- **Chairman: Mr. Huigao Zhou, China**

- **Secretary: Mr. Lev Travin, Russian Federation**

- **Assistant secretary: Mr. Evgeny Basov, Russian Federation**

- **Membership**

- **13 P-members (Participate actively in the work):** China, Finland, France, Germany, Japan, Korea (Republic of), Netherlands, Norway, Russian Federation, Serbia, Switzerland (**new member**), Sweden, UK

- **21 O – members (Kept informed of the progress):** Australia, Austria, Belarus, Belgium, Bulgaria, Croatia, Czech Republic, Denmark, Hungary, India, Iran, Italy, Malaysia, New Zealand, Poland, Portugal, Romania, South Africa, Spain, Thailand, Ukraine

IEC SC22F – plenary meeting was cancelled in 2020



The SC 22F plenary and working group meetings originally planned to be held during the IEC General Meeting 2020 in Stockholm have been deleted due to the COVID-19 pandemic.

- The SC 22F plenary meeting in 2020 was cancelled and postponed to 2021 October (to be held in conjunction with the parent committee TC 22 during the 2021 IEC GM in Dubai, UAE) because online meeting for SC 22F would be difficult and inefficient in view of the required 3 full days of meeting for discussion 14 projects;**
- Urgent topics and decisions were decided by correspondence;**
- Discussion related to SC 22F projects were handled by the SC 22F Secretariat with the respective working groups (WG, MT, AHG, etc.) by correspondence through the Collaboration Platform and/or web meeting.**



IEC SC 22F – new procedure in 2020

The procedure of the online project development on CC, RVC, RVDTR, etc, stages:

1. The procedure concerns only IEC working documents containing P-members' technical comments and some general comments concerning a technical content of a project. If a document does not contain NC's technical comments it is developed in an usual way.
2. A document containing P-members' technical comments is send by the SC 22F secretariat to the SC 22F Chair and Project Leader with the request to ask the WG, MT, AHG members to resolve through a web meeting Secretariat's Observations on the P-member's technical comments and send their comments, if any, to the Project Leader and SC 22F secretary by e-mail within two weeks.
3. After discussing the document by the Chair, Project Leader and WG/MT, taking into account corresponding changes (if any) the document is submitted by the Secretary through the Projects Dashboard for circulation with a note from the TC/SC officers to mention that the observations of the Secretariat on P-members' technical comments have been prepared in consultation with the Chair, Project Leader and WG, MT, AHG members.
4. P-members objecting to any of the Observations of the Secretariat on technical comments shall inform the Central Office with copy to the secretary in writing within 4 weeks of the circulation of this CC.
5. If any feedback from the P-members after 4 weeks does not received, SC 22F secretarist can proceed to prepare the project for the next stage. If some P-members object to any of the Observations of the Secretariat on P-member's technical comment, the Secretariat's decision will depend on the simple majority of numbers of voted and objecting P-members.

IEC SC 22F General information — Statistics

	2020	2021
Number of IEC publications developed	66	72
Number of Working Groups, Project Teams, Maintenance Teams, Ad Hoc Groups	27	28
Number of experts	166/241	167/283
Number of new projects submitted in the past 5 years	7	8
Number of current active projects	17	18
Number of meetings since the last 5 years	4	4

IEC SC22F

Established liaisons

Internal

- **SC17A– Switching devices** (SC 17A/SC 22F WG 64)
- **TC 33 – Power capacitors and their applications** (TC 33/SC 22F JWG 22F)
- **TC 42 - High-voltage and high-current test techniques** (TC 42/SC 22F JWG 22)
- **TC 89 - Fire hazard testing** (SC 22F/TC 89 JMT4)
- **TC 115 - High Voltage Direct Current (HVDC) transmission for DC voltages above 100 kV** (TC 115/SC 22F JWG 11; TC 115/ SC 22F JMT 1; SC 22F/TC 115 JMT5; SC 22F/TC 115 JAHG 1)

External

- **CIGRE SC B4 – HVDC and Power Electronics** (Many IEC Publications produced by SC 22F are based on CIGRE B4 Reports/Brochures).

Results of CIGRE SC B4/IEC SC 212F cooperation in 2017-2020



CIGRÉ Technical Brochure	IEC Publication
<p>TB 447 2011 B4-48 Components Testing of VSC System for HVDC Applications</p>	<p>IEC 62501, Ed.1.0: Voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) power transmission - Electrical testing (Amendment 2)</p>
<p>TB 223 2003 SC B4 WG B4.28 Active filters in HVDC applications</p>	<p>IEC TR 62544, Ed.1.0: High-voltage direct current (HVDC) systems - Application of active filters (Amendment 2)</p>
<p>TB 136 1999 SC 14 TF 14.01.04 Fire aspects of HVDC thyristor valves and valve halls</p>	<p>IEC/TR 62757, AMD2, Ed.1.0: Fire Prevention Measures on HVDC, SVC and FACTS converters and their valve halls</p>
<p>TB 754 2019 SC B4 WG B4.67 AC side harmonics and appropriate harmonic limits for VSC HVDC</p>	<p>IEC TR 62001-5, Ed.1: AC side harmonics and appropriate harmonic limits for HVDC with voltage sourced converters</p>



Updated Publications

- **IEC TR 60919-1 ED4**, 2020-04-16: Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 1: Steady-state conditions (JMT 5, Convenor Mr Hong RAO, China);
- **IEC TR 60919-2 AMD2 ED2**, 2020-04-27: Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 2: Faults and switching (JMT 5, Convenor Mr Hong RAO, China);
- **IEC TR 62544 AMD2 ED1**, 2020-02-05: High-voltage direct current (HVDC) systems - Application of active filters (MT 29, Convenor Mr Gearoid O'HEIDHIN);
- **IEC 61803 ED2**, 2020-10-16: Determination of power losses in high-voltage direct current (HVDC) converter stations with line-commutated converters (MT 14, Convenor Mr Sanjay MUKOO, Germany);
- **IEC 60633 Cor1 ED3**, 2020-02-26: Terminology for high-voltage direct current (HVDC) transmission (MT 31, Convenor Mr. Colin Davidson, United Kingdom).

- **IEC 60700-1 AMD1 ED2: Thyristor valves for high voltage direct current (HVDC) power transmission - Part 1: Electrical testing** (MT9, Convenor Mr Shigeru TANABE, Japan) – **Working Draft (WD)** → **Committee Draft for Comments (CD)** → **Compilation Of Comments On Committee Draft (CC)**;
- **IEC 60700-2 AMD1 ED1: Thyristor valves for high voltage direct current (HVDC) power transmission - Part 2: Terminology** (MT32, Convenor Mr Yantao LOU, China) - **Working Draft (WD)** → **Committee Draft for Comments (CD)** → **Compilation Of Comments On Committee Draft (CC)**;
- **IEC 60700-3 ED1: Thyristor valves for high voltage direct current (HVDC) power transmission – Part 3: Essential ratings (limiting values) and characteristics** (WG 35, Convenor Mr Yantao LOU, China) - **Working Draft (WD)** → **Committee Draft for Comments (CD)** → **Compilation Of Comments On Committee Draft (CC)**;
- **IEC 61954, ED3: Static var compensators (SVC) - Testing of thyristor valves** (MT10, Convenor Mr Marcio de OLIVEIRA, Sweden) – **Working Draft (WD)** → **Committee Draft for Comments (CD)** → **Compilation Of Comments On Committee Draft (CC)**;

- **IEC TR 62001-1 ED2: High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters – Part 1: Overview** (MT21, Convenor Mr. Gearoid Sean O'HEIDHIN, United Kingdom) – **Working Draft (WD) → Committee Draft for Comments (CD) → Compilation Of Comments On Committee Draft (CC)**;
- **IEC TR 62001-4 ED2: High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters – Part 4: Equipment** (MT21, Convenor Mr. Gearoid Sean O'HEIDHIN, United Kingdom) – **Working Draft (WD) → Committee Draft for Comments (CD) → Compilation Of Comments On Committee Draft (CC)**;
- **PWI TR 22F-17 ED1 - IEC TR 62001-5 ED1: High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters – Part 5: AC side harmonics and appropriate harmonic limits for HVDC with voltage sourced converters** (MT21, Convenor Mr. Gearoid Sean O'HEIDHIN, United Kingdom) – **Working Draft (WD) → Committee Draft for Comments (CD)**;

IEC SC22F – 3 Preliminary Projects discussed in 2020

- **PWI TR 22F-11 ED1 - Performance of power electronic reactive power shunt compensators in high-voltage alternating current (HVAC) systems** (AHG1, Convenor Mr. Marcio Oliveira, Sweden) – **Preliminary draft for discussion (DC)**;
- **PWI 22F-15 Ed.1: Control and protection systems for high-voltage direct current (HVDC) power transmission systems - Functional performance tests** (SC22F/TC115 JAHG1, Convenor Mr. Hong RAO, China) – **Preliminary draft for discussion (DC) – 2020-12**;
- **PWI 22F-16 ED1 - Unified power flow controller (UPFC) installations – System tests** (AHG5, Convenor Mr. Zhicheng ZHOU, China) - **Preliminary draft for discussion (DC) – 2020-11**;

- IEC TR 62001-1 ED2, 2021-07-13: High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters – Part 1: Overview (MT 21, Convenor Mr. Gearoid Sean O'Heidhin, United Kingdom);
- IEC 60700-2 AMD1 ED1, 2021-08-23: Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 2: Faults and switching (MT 32, Convenor Mr. Yantao LOU, China);
- IEC TR 62001-5 ED1, 2021-08-25: High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters – Part 5: AC side harmonics and appropriate harmonic limits for high-voltage direct current (HVDC) systems with voltage sourced converters (VSC) (MT 21, Convenor Mr. Gearoid Sean O'Heidhin, United Kingdom);
- IEC 60700-1 AMD1 ED2: (PPUB) Thyristor valves for high voltage direct current (HVDC) power transmission - Part 1: Electrical testing (MT 9, Convenor Mr. Shigeru Tanabe, Japan);
- IEC TR 62001-4 ED2: (PPUB) High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters - Part 4: Equipment (MT 21, Convenor Mr. Gearoid Sean O'Heidhin, United Kingdom);
- IEC TR 60919-3 AMD2 ED2: (RPUB) Performance of high-voltage direct current (HVDC) systems with line-commutated converters - Part 3: Dynamic conditions (JMT 5, Convenor Mr. Weimin MA, China).

IEC SC22F - 9 Projects are developed in 2021 (1/2)



- **IEC 60700-3 ED1: Thyristor valves for high voltage direct current (HVDC) power transmission - Part 3: Essential ratings (limiting values) and characteristics** (WG 35, Convenor Mr Yantao LOU, China) – **CD, PCC** (2021-09-10);
- **IEC 61954, ED3: Static var compensators (SVC) - Testing of thyristor valves** (MT10, Convenor Mr Marcio de OLIVEIRA, Sweden) – **CFDIS, PRVD** (2021-09-10);
- **IEC 61975/AMD2 ED1: High-voltage direct current (HVDC) installations - System tests** (MT 27, Convenor Mr Guangheng PANG, China) – **CD, PCC** (2021-10-01);
- **IEC TR 62001-2 ED2: High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters - Part 2: Harmonic performance aspects** (MT 21, Convenor Mr. Gearoid Sean O'Heidhin, United Kingdom) - **CD, PCC** (2021-10-15);
- **IEC TR 62001-3 ED2: High-voltage direct current (HVDC) systems - Guidance to the specification and design evaluation of AC filters - Part 3: Modelling aspects** (MT 21, Convenor Mr. Gearoid Sean O'Heidhin, United Kingdom) - **CD, PCC** (2021-10-15);

IEC SC22 - 9 Projects are developed in 2021 (2/2)



- **IEC TR 62543 ED2: High-voltage direct current (HVDC) power transmission using voltage sourced converters (VSC)**(MT23, Convenor Mr. Colin C Davidson, United Kingdom) – **CDTR, RVDTR** (2021-10-08);
- **IEC IEC 62751-1/AMD2 ED1: Amendment 2 - Power losses in voltage sourced converter (VSC) valves for high-voltage direct current (HVDC) systems - Part 1: General requirements** (MT31, Convenor Mr. Colin C Davidson, United Kingdom) – **TCDV, CCDV** (2021-09-29);
- **IEC TR 63259 ED1: Water cooling system for power electronics used in electrical transmission and distribution systems:** (MT21, Convenor Mr. Zhang Guangtai , China) – **CDTR, PRVDTR** (2021-10-08);
- **IEC TR 63368 ED1: Control and protection systems for high-voltage direct current (HVDC) power transmission systems - Off-site real-time testing** (JAHG 1, Convenor Mr. Hong Rao, China) – **ACD, 2CD** (2022-06-30).



IEC SC22F - 2 Convenor's Reports on PWI



- Report of Mr. Zhicheng ZHOU, the convenor of SC 22F/ahG5, on the project PWI 22F-16 ED1: “Unified power flow controller (UPFC) installations – System tests”
- Discussion of comments on the project PWI TR 22F-19 ED1: “Performance of power electronics transformer for flexible transmission and distribution system” (Convenor of SC 22F/ahG 6 Mr. Biao ZHAO, China).



The following subjects were also considered at the online plenary SC 22F meeting on October 4 and 6:

1. The Work Programme of SC 22F was updated for 2022.
2. Appointment / reappointment of Convenors
3. Review liaisons
4. Review of P-members participation

SC 22F made more in 2020-2021 than in 2018-2019 in spite of COVID-19 conditions.

**SC 22F secretariat warmly thanks the Chair,
all the convenors and experts of our Subcommittee
for their noble work,
our Technical Officers and Editors for their help
and wishes them
good health, happiness and continued success.**

Lev Travin