A3-00

SPECIAL REPORT FOR SC A3

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Introduction

Due to the situation of the global pandemic, the Paris Session has been postponed from 2020 to 2021. In 2020 all authors were requested to present their papers during the 2020 CIGRE e-session. In 2020 no special report was published. The Paris Session 2021 will follow the well-known procedure of the group discussion meeting, whereas this special report contains the initial questions for the discussion.

SC A3 identified three Preferential Subjects (PS) for the Paris e-Session 2020 and now as well for the Paris Session 2021.

PS 1 "FUTURE DEVELOPMENTS OF TRANSMISSION AND DISTRIBUTION EQUIPMENT"

- Medium Voltage DC circuit breakers.
- Measures to improve reliability.
- Developments of equipment with reduced environmental impact.
- SF6 alternatives for switching and isolation.

PS 2: "LIFETIME MANAGEMENT OF TRANSMISSION & DISTRIBUTION EQUIPMENT"

- Diagnosis and prognosis / monitoring of equipment.
- Influence of environmental and operating conditions.
- Experience and countermeasures for overstresses and overloads.

PS 3: "IMPACT OF DISTRIBUTED RENEWABLE GENERATION AND STORAGE ON TRANSMISSION AND DISTRIBUTION EQUPMENT"

- New and emerging technologies for switching devices and other equipment.
- Incorporation of intelligence into the equipment.
- Impacts of distributed renewable energy sources and energy storage on equipment requirements.

47 abstracts have been submitted, which were mainly addressing the PS1 and PS2. Only three abstracts have been submitted under PS3.

After a closer review of the received 45 papers, also the three originally submitted papers under PS3, were actually better part of the other two subjects and have been considered under PS1 (A3-301, A3-302) and PS2 (A3-303).

This resulted in 20 reports under PS1 and 25 reports under PS2.

The SC A3 Session covers a wide scope of technical equipment, while experts are usually dealing with only a few of the categories of equipment under discussion. To facilitate the audience, the presentations will be discussed per category of equipment (or specific topic).

A category or a specific topic may cover Reports attributed to more than one Preferential Subject.

Each topic is introduced by a special reporter who leads and moderate through the topic. All submitted and accepted prepared contributions will be published in the Session Proceedings as well as the spontaneous contributions. Further information are given at the end of this Special Report.

This report is intended to give the audience an overview of the papers submitted and their contents. This way the reader can quickly get an overview to filter out the papers that are interesting for him and then follow the right presentations

Categorization

The reports have been grouped in eight categories.

Category	Number	PS1	PS2
I HVAC switchgear	6	1	5
II Controlled switching	4	1	3
III HVDC switchgear	4	4	0
IV Equipment Reliability	9	0	9
V Instrument Transformers	5	1	4
VI Medium Voltage equipment	3	1	2
VII SF6 alternative	11	10	1
VIII Testing	3	2	1

Table 1 : Categorization of papers

I HVAC switchgear

Six Reports were grouped under this category mainly belonging to the preferential subject 2. They propose solutions to overcome or prevent problems in high voltage switchgear. Fault current limitation, diagnostic method for grading capacitors, derating methods for high time constants, damping over-voltages and prevent external flashover.

A3-107 proposes a current limiter composed of a commutator operated by means of explosive charge and a fast fuse branch. The solution has been tested with the 10 kA and showed a dielectric withstand capability up to 500 kV.

A3-204 illustrates a diagnostic procedure to detect degradation in grading capacitors connected to a 400 kV circuit breaker. By means of radio frequency antennas partial discharges could be measured in grading capacitors just after current zero when they are stressed by the transient recovery voltage of the reactor banks. The correlation between measured partial discharges and damping time of the reactor voltage could be verified by means of electric field sensors installed near to the reactants. Collected measurements compared with the failure experience allowed defining the intensity of PD signal that could prognoses possible capacitor failure in the next 25 circuit breaker operations. For the 2021 Session the paper was updated illustrating a more in-industrialized solution with reduce number of combined sensors as well as a self-recording system.

A3-205 proposes a comparison between de-rating approaches for symmetrical current interrupting conditions in case the time constant L/R exceeds the tested one. Accurate constant arc voltage and accurate constant arc resistance methods are compared with the equivalent simplified methods as described by CIGRE TB304. A summary table provides which TSOs use which method.

A3-215 focuses on the development steps to allow interrupting 63 kA without any line to ground capacitance. Flow calculations as well as modifications in the nozzle geometry are illustrated together with the experimental results to achieve the successful design.

A3-216 presents a study to reduce the very fast transient over voltages (VFTO) in a 800 kV GIS caused by the operation of the disconnecting switch. The test setup has been designed based on EMTP simulations. Tests carried out with different numbers of nanocrystal line magnetic rings at different voltage showed a reduction of VFTO peaks up to 17%. For its application reflection effects must be taken into account to define the optimal position of the ring, this can be achieved by modelling the GIS by means of EMTP simulation.

A3-222 proposes an analysis of the dielectric breakdown across the interrupting chamber of a 245 kV live tank circuit breaker installed close to seashore when working under out of phase conditions. The frequent phase opposition voltage stress combined with severe pollution conditions were the reason of the failure, which could be reproduced in laboratory tests and mitigated by a longer creepage distance for chamber insulator and a new setting of the protection relay.

Questions

Q1-1–A3-307 illustrates a solution to overcome the increase of the fault current beyond 63 kA, which is a quite high level for a 220 kV grid. Is the higher and higher fault current going beyond the typical circuit breaker ratings a recognized general trend also in other countries and or voltage systems?

Q1-2 –A3-204 shows an additional application of partial discharge detection technology in identifying problems with grading capacitance and high voltage circuit breaker in general because of remarkable development and experimentation efforts. Is this an indication the preventive condition-based maintenance concept applied since years in the transformer world started focusing more and more on switchgear as well?

II Controlled switching

In SC A3 controlled switching is a discussed topic over years. At least WG A3.35, "Commissioning practice of controlled switching" published their TB in 2018. Controlled switching is presented in the following four transmitted reports: A3-115, A3-202 A3-208 and A3-303.

The papers A3-115 and A3-202 report on the increase of reliability by controlled switching. In A3-208, however, the use of a device for controlled switching is reported, which is independent of the circuit breaker manufacturer. The current practice is that the circuit breaker and the control device are rather a unit of one supplier. This approach is confirmed in paper A3-303, as the submitted report points out that the parameters of the circuit breaker such as RDDS, mechanical scatter, idle time etc. are essential for safe operation.

Questions

Since reliability is a central issue, the Special reporters would like to discuss the following question: **Q2-1-** Are there figures showing how much reliability has been increased by controlled switching? Have maintenance costs and unplanned outages times been reduced?

III HVDC switchgear

In association with the expansion of DC application in power systems, demands for DC switchgear are also increasing. In CIGRE, JWG A3/B4.34 published TB 683 in 2017 and WG A3.40 and JWG B4A3.80 are working for MVDC switchgears and HVDC switchgears respectively. Four reports deal with DC-circuit breakers, DC-GIS and relevant technologies. A concept of hybrid DC-circuit breaker with new ideas and technologies is proposed in report A3-101. The sequential tripping of the solid state modules allows a gradual increasing of the voltage apply to the fast disconnector resulting in a shorter clearing time and a lower peak of fault current. The fault current commutation circuit consisting of pre-charged capacitor and semiconductor switches enables the commutation of fault current with low voltage less than 200 V and small power, e.g. 100 W. The fast mechanical switch with piezo-electric actuator and super critical CO_2 achieves a contact gap of 0.1 mm and average breakdown voltage of 25 kV (DC) within several hundred microseconds.

Report A3-103 proposes a concept of a DC-circuit breaker, applying the "VSC (voltage source converter) assisted resonant current". Instead of semiconductor device, a standard vacuum interrupter bottle, which is actuated by a fast-acting Thompson coil operating mechanism, is used for a main interrupter to reach a higher voltage handling capability. A 6 mm gap of the vacuum interrupter was obtained in 2.5 ms and a 10 kHz resonant circuit triggered by VSC allows having a zero crossing in few hundred microseconds. Consequently, the circuit breaker enables DC-current interruption with few milliseconds. Test results are reported for a test object consisting of three modules connected in series with interruption capability of 12 kA peak current against the transient interruption voltage of 120 kV.

Report A3-105 introduces developments of two different types of HVDC-circuit breaker and experience of operation of DC-GIS in Japan. One of the HVDC-circuit breaker is a mechanical type and another is a hybrid type, but both of them consist of a mechanical switch with metal contact for a main circuit to realize low losses when the circuit breaker is in closed position. Test results for a 160/200 kV class mechanical circuit breaker with 16 kA and a 40 kV – 14.9 kA hybrid circuit breaker were reported. In addition, around 20-year experience of 500 kV/ 250 kV DC-GIS operated at ±250 kV DC and newly developed and installed 250 kV DC-GIS were introduced.

Report A3-302 presents the feasibility study of the bi-stable disc spring mechanism for an ultra-fast switch, which could improve the performance of hybrid type HVDC-circuit breaker. The operation speed of ultra-fast switch almost determines the current interruption time of hybrid

HVDC-circuit breaker, and Thomson coil or piezo device are often applied for the actuator of its ultra-fast switch. In the report, authors propose the bi-stable disc spring mechanism as an alternative solution for the purpose and some of analytical and experimental results are reported.

Questions

Q3-1 - Mechanical switches are applied not only to the mechanical DC-circuit breakers but also to the hybrid DC-circuit breakers, which usually dominant the interruption time of the DC-circuit breaker. Can experts provide the viewpoints or suggestions of design of mechanical contacts to achieve the performances required in the DC grid. The bi-stable spring mechanism reported in A3-302 claims a shorter operating time than solenoid solutions. The operating time of any switching equipment is referred to the beginning of the trigger signal. In the report only the time of movement is studied and tested. It is not clear which assumptions have been made regarding the time between the command to operate and the beginning of the movement.

Q3-2- In general, requirements of DC-circuit breaker strongly depend on the grid conditions compared to AC-circuit breaker. Can utilities give opinions about the requirements of DC-circuit breakers which applied to the cable lines or overhead lines, such as breaking current, breaking time and reclosing. Will the requirements be different between MVDC and HVDC? Can experts suggest the special requirements of DC-switchgears for the purpose of offshore wind application? In particular, should the severer climatic condition be taken into account in comparison with usual equipment used overland?

IV Equipment Reliability

The Equipment Reliability topic includes nine papers from Preferential Subject 2, Lifetime management of Distribution and Transmission Equipment. The papers included in this topic features a variety of subjects covering equipment reliability surveys, equipment maintenance practices, equipment aging factors affecting performance, use of sensors in equipment for asset management, and the use of the internet of things for predictive based maintenance and modelling.

In Report A3-201 the preliminary results from the CIGRE SC A3 fourth substation equipment reliability survey covering the period 2014-2107 are presented and compared with previous reliability survey results. The survey includes SF_6 circuit breakers, disconnectors, earthing switches, instrument transformers gas insulated switchgear and vacuum circuit breakers and focuses on major failures.

Report A3-206 details the lifetime and maintenance practices survey results of 468 circuit breakers with rated voltages of 72 kV to 300 kV used in frequent shunt capacitor and reactor switching situations at three Japanese utilities. Maintenance practices have been developed over time which have shown a high reliability and long life is achievable for demanding switching applications.

Report A3-207 provides details of the experience of hollow core composite insulators used in high voltage substation equipment in high pollution areas of Italy over several years in service**.** Several physical-chemical tests were carried out on the insulator material taken from service and compared with new materials, with ongoing statistical analysis of the results looking at the overall performance of composite insulators.

Report A3-209 presents the results of activities involving internal x-ray inspection of 110 kV minimum-oil type live tank circuit breakers in Russia. The inspections are carried out as a replacement for intrusive inspections during maintenance. The results of the studies showed the x-ray testing revealed 75% of specific internal defect types commonly found in the circuit breakers examined could be found. and the x-ray image resolution size is around 1 mm.

Report A3-211 investigates the influence of contact heating on high voltage circuit breaker main contacts prior to taking resistance measurements and dynamic resistance measurement as

part of circuit breaker maintenance to determine contact erosion. The report details a test procedure to carry out contact heating by current injection prior to the resistance measurements, which relieves the influence of metal fluorides on the contact surface.
Report A3-213 examines the effects of aging on MV switchgear and whether performance and ratings are compromised over the installed switchgear lifetime. Several aged MV switchgear assemblies were dismantled and inspected for signs of aging effects before components were subjected to dielectric testing, short time current, and circuit breaker making and breaking tests. The test results were compared with the original type tested ratings of the switchgear and found that some degradation had occurred as part of the aging process which had affected performance of the equipment.
Report A3-217 provides the experience of the use of Internet of Things (IoT) based predictive technologies in equipment condition assessment that is then fed into a risk-based review of maintenance requirements. The sensors used included thermography, wireless temperature sensors, circuit breaker timing, insulation resistance, tan delta measurement and ultrasonic monitoring of equipment.
Report A3-221 details the use of smart sensors applied to substation equipment (disconnectors) to measure temperature, contact displacement and leakage current along with motor operation data for asset management and maintenance and development of asset health indices. The data has also been used to compare against a digital twin web-based model of the equipment.
Report A3-225 details the design and development process of new asset-type models to enable the use of data mining to enhance asset management systems, whist reducing costs on utilities associated with data collection and analysis.

Questions
Q4.1- Several reports presented in this topic have highlighted the use of on-line and off-line condition assessment methods that has resulted in discovering issues before failure. Reports A3-206 and A3-209 also showed changes to maintenance activities and requirements can all lead to longer equipment life. How can the longer equipment life be balanced against “unseen” deterioration in insulation quality and rating performance as was shown in Report A3-213 and can this be applied to HV equipment? What factors will be used for future end-of-life assessment for equipment replacement, including data for inclusion in substation equipment Asset Health Indices?

V Instrument transformers
The instrument transformer topic includes 5 reports from PS1 and PS2. Three reports cover non-conventional instrument transformers and their performance under extenuating conditions, whilst the remaining two reports look at ferroresonance modelling and testing and the development of a conventional instrument transformer fitted with sensors for on-line condition monitoring.
Report A3-108 proposes a comprehensive analysis of non-conventional current and voltage transformers showing amplitude and angular frequency response as well as electric magnetic immunity from adjacent current conductors are also presented together with the influence of temperature variation. Report A3-210 reports on the development of a paper-oil insulated current transformer with inbuilt sensors to monitor internal temperature, internal pressure and dissolved hydrogen. These on-line sensors will provide data for the use in warning and alarm systems by users. Report A3-214 details the investigation of ferroresonance in magnetic voltage transformers (MVT) with mathematical modelling and comparison with actual MVT's used to predict actual behavior under ferroresonance conditions. Report A3-223 showed the installation of optical current transformers in a hydro power plant which will be used to the monitor of response their response to high asymmetrical s/c currents and the comparison between

conventional CT's using fault recorders. Report A3-224 details an investigation into the accuracy of a combined low-power instrument transformer (cLPIT) in a long-term trial in different climatic and pollution conditions. The cLPIT provides a combined optical current transformer output along with a capacitive voltage transformer output for use in a digital substation environment.

Questions

Q5.1 - For condition monitoring of conventional paper-oil instrument transformers, are on-line sensors seen as an advantage to off-line testing such as dissolved gas analysis. How reliable will these sensors be for long term service and is periodic calibration of the sensors is required? What about other tests that users employ for instrument transformer condition monitoring such as dielectric testing, what other sensors could be incorporated for on-line condition monitoring?

Q5.2 - How prevalent is the use of stand-alone NCIT's in power systems as compared to conventional IT's. Can experts provide examples of trials carried out in the introduction and use of NCIT's or combining their use with conventional IT's. Have users found advantages or disadvantages in the use of NCIT's over conventional IT's?

VI Medium Voltage equipment

Medium voltage equipment is also part of the scope of study committee A3. Three reports were submitted for this purpose. The reports are A3-109, A3-218 and A3-219.

The first paper A3-109 describes the modernization of a power plant with the latest medium voltage technology. The other two papers, A3-218 and A3-219, examine fault frequencies caused by overvoltages and environmental influences in already existing technology.

The common feature of the three papers, however, is that lifecycle costs are the decisive factor in deciding which modernization or fault mitigation measure shall be used.

Questions

Q6-1 - What trends are noticeable in medium voltage to reduce lifetime costs? Are there measures to reduce the CO_2-footprint? Does digitalization help with this?

VII SF6 Alternatives

Under this category, there are 11 papers, 10 assigned to the first and 1 to the second preferential subject. This confirms the high interest in the R&D for this topic. Meanwhile the first field experiences are available allowing comparing different solutions.

Fluoronitrile based mixture with 6 reports is the most discussed technology, followed by Air combined with vacuum interrupters.

A3-102 presents a detailed LCA comparison among three alternative technologies for a dead tank breaker rated 72.5 kV, 40 kA, 2000 A to be installed in climatic region with minimum temperature of -30 °C: Fluoronitile mixture, and two vacuum based nitrogen oxygen gas mixture. All the three SF_6 free alternative solutions showed a reduction in climate change impact in a range between 50% and 60%. The lowest GWP impact is achieved by the Fluoronitile mixture, whereas the two vacuum based designs showed an advantage regarding ozone depletion due absence of PTFE material.

A3-106 presents the design of a 145 kV – 63 kA dead tank circuit breaker upgrading the existing 145 kV – 50 kA GIS design based on vacuum interrupter combined with clean air insulation.

A3-110 proposes redesign of 12 kV RMU from SF_6 to Fluoronitrile mixture. Load current switching performance is compared for the two cases analyzing high speed movies of the arc in the plate region. Those supported design adaptations as well as the identification of the optimal percentage of Fluoronitrile.

A3-112 proposes the use of grading capacitors for circuit breakers with multiple vacuum interrupters per pole. Although the study focused specifically on vacuum interrupters, the conclusions regarding voltage grading as well as capacitance values are pretty much comparable to the one of more common SF_6 interrupters traditionally in use since long time.
A3-113 focuses on CFD simulation method apply to both SF_6 and SF_6-free circuit breakers. Emphasis is given to support vector machine, which allowed the identification of the key parameters for predicting the performance. The collected experience with the SF_6 geometry has been then transferred to the Fluoronitrile-based gas mixture. The simulation results have been validated for both puffer as well as self-blast interrupters.
A3-114 reports about the development of 170 kV GIS based on a Fluoronitrile mixture. It is quite interesting to see the development has been carried out by two different manufacturers, who collaborated here to speed up the development cycle and reduce costs.
A3-116 illustrates the SF_6 free medium voltage switchgear design. For the insulation HFO1234zeE has been selected for its very low toxicity as well as for the low GWP. To overcome its reduced breaking capacity, the interruption of the nominal current has been delegated vacuum bottle, which is only engaged during the opening operation and it is designed to clear the nominal current only. The making function is provided by the same blade for disconnector end earthing switch.
A3-117 summarizes the experience collected after three years for three pilot projects insulated with Fluoronitrile gas mixture: 420 kV GIL, 145 kV GIS and a 245 kV CT. The research to define the optimum gas percentage in the CO_2/O_2/ Fluoronitrile mixture to ensure a clearing capability of 63 kA is presented in the second part. A whole paragraph is dedicated to the percentage of oxygen, which has an optimum value of around 13%.
A3-118 focuses on Fluoroketone mixture application. A design modification is presented allowing a fast earthing to achieve equivalent induced current interruption performance then the SF_6 based design. A spring is added to the refilling valve of a hanging high voltage interrupter design to keep it in close position and by this gaining compression volume pressure.
A3-119 addresses the "consumption" of the Fluoronitrile, which cannot recombine after every interruption being a long molecule. More in general the degradation of gas mixtures based on long molecules is an additional aspect that influences the electrical wear. This can become a key parameter in case the total volume of the circuit breaker is small. For such applications it becomes important to have a reliable gas consumption calculation methodology.
A3-301 reports the development steps to achieve the design of 170 kV GIS making use of clean air insulating technology combined with vacuum interrupter. Like in the A3-117 report, this was the outcome of cooperation between two manufacturers.

Questions

Q7-1 - The use of grading capacitors is a well-recognized technical solution since many years for high voltage circuit breakers as reported in the TB 368. In A3-112 the study and the tests specifically focused on vacuum interrupters. Since in the conclusion both voltage grading and capacitance confirmed the known values, it is not evident to the reader if a different behaviour was expected, and which is the addressed novelty.

Q7-2 - In A3-114 and A3-117 is reported a development carried out in cooperation with two manufacturers, although common in other industry branches like automotive, this is a novelty in the electrotechnical world. Is this the beginning of a new tendency to optimize development cost and time?

Q7-3 - Different gas mixture applications use different mixture percentage which could vary among different manufacturers. From final users' standpoint this could lead to possible refilling mistakes in case circuit breakers from different manufacturers are installed in the same

substation. Is it imaginable to define a commonly agreed mixture ratio for the two gas mixtures based on Fluoronitrile and Fluoroketone to minimize this risk?
Q7-4 - A3-118 - A drawback of having a spring-loaded refilling valve could lead to a less efficient refilling during the O-CO fast recloser duty impairing the clearing performance of the last O. Was this condition considered during the development?
Q7-5 - Like reported in A3-117, gas mixture solutions show a medium "consumption" due to no recombination which need to be evaluated to ensure electrical endurance performance. Although this is a design specific behaviour, is it thinkable to agree upon a general guideline which could allow a first condition assessment of circuit breakers based on this new technology?

VIII Testing
In order to ensure the capabilities of equipment, continuous improvement of testing is crucial and it may become concerns when new technologies are developed or unexpected phenomena are observed in the field. The Reports A3-104, A3-111 and A3-212 deal with this topic. Report A3-104 introduces the required technologies and facilities for testing to couple with the emerging medium and high voltage equipment technology. A 50% higher transmission capability is forecasted for the coming years, part of which will be handled which HVDC new lines. The impact of distributed energy resources will require a grid redesign introducing new functionalities and consequent test duties. In particular, “Increase of system power”, “Offshore transmission”, “Health, safety and environment related”, “HVDC switchgear and power electronics”, “Digitalization” and “Resilience and fault mitigation” were discussed. Remote testing is also discussed as an effective counter measure to the restrictions caused by pandemic. Report A3-111 presents the new test procedure introduced in China in 2018 for UHV and EHV circuit breakers operating with filter banks. The initiative was motivated by the high failure rate of circuit breakers in the grid, which are tested according to the IEC 62271-100. This seems to be the consequence of the more and more common HVDC connections which require filter banks in the converter station to reduce the harmonic content on AC side. Risks and the mechanisms of flashover, restrike or breakdown of circuit breakers used with filter banks are investigated, and severer test duties are applied for such circuit breakers.
Due to the requirement of the expanding introduction of IoT technology including sensors and electronic devices into substations, their electromagnetic compatibility will be the issues. Some results of their research on testing of electromagnetic disturbances in substations are introduced in Report A3-212. Basic experiments were conducted by using a spark gap and measurement of electromagnetic waveform was conducted.

Questions
Q8-1 - Digital technologies provide various benefit to testing of T&D equipment as same as other field of industries. Can experts share the knowledge of advanced IoT tools applied to testing? Can utilities or manufacturers introduce the challenges of using digital technologies in the T&D field, such as electromagnetic compatibility? Although digital technologies are very effective also for remote testing, actual works, such as assembly of test objects, will still remain. What can be the difficulties or technical problems in remote testing? What is the opinion of users about this new trend?
Q8-2 - Due to the changes of grid conditions or environment, new requirements must be given to the existing equipment as mentioned in Report A3-111. Do experts have any suggestions of additional requirements for conventional equipment? Report A3-111 also describes NSDD observed in the testing of gas circuit breakers, especially of the ratings of 550 kV – 1,100 kV. Can experts of laboratories or manufacturers introduce the experience of NSDD observed in the testing of gas circuit breakers?

General information

Within SC A3, dealing with AC & DC Transmission & Distribution equipment, seven Working Groups have published their Technical Brochures from the last Paris Session 2018 to the current one Paris session 2021.

A3.29	Ageing high voltage substation equipment and possible mitigation techniques (TB 725)
A3.30	Substation equipment overstress management (TB 816)
A3.31	Instrument transformers with digital output (an summary will be presented)
A3.32	Non-intrusive methods for condition assessment of distribution and transmission switchgear (TB 737)
A3.35	Guidelines and best practices for the commissioning and operation of controlled switching projects (TB 757)
A3.36	Application and Benchmark of Multi Physic Simulations and Engineering Tools for Temperature Rise Calculation (TB 830)
A3.38	Capacitor switching in distribution and transmission systems (TB 817)

Other Working Groups under A3 lead or with A3 participation are:

A3.39	Application and field experience with Metal Oxide Surge Arresters
A3.40	Technical Requirements and Testing Recommendations for MV DC switching equipment at distribution levels
A3.41	Interrupting and switching performance with SF6 free switching equipment
A3.42	Failure analysis and risk mitigation for recent incidents of AIS instrument transformers
A3.43	Tools for lifecycle management of T&D switchgear based on data from condition monitoring systems
B4/A3.80	HVDC Circuit Breakers - Technical Requirements, Stresses and Testing Methods to investigate the interaction with the system
C4/A3.53	Application Effects of Low-Residual-Voltage Surge Arresters in Suppressing Overvoltages in UHV AC Systems
A3/A2/A1/B1.44	Consequence of High Voltage Equipment operating exceeding highest system voltages
A3.45	Methods for identification of frequency response characteristic of voltage measurement systems
A3.46	Generator Circuit-Breakers: review of application requirements, practices, in-service experience and future trends
B4/A3 86	Fault Current Limiting Technologies for DC Grids

Important information and dates

Experts who wish to contribute to the SC A3 Session are required to upload their contribution on the *Registrations platform* – "Contributions to Group Discussion Meetings" section - using their existing account and own credentials .
Please note that access to contribution uploading is given only to registered delegates.
Therefore, registration to CIGRE Session should be finalized before uploading contribution(s) online. Register now for the Session *Click here*
The portal for uploading contributions will be open at the beginning of May. The **deadline** for submitting contributions is **August 1st**.
A3 Committee Chair and Special Reporters will review and possibly comment the contributions. Contributors are encouraged to visit their account on the Registration Platform to see the result of this review.
A guide for contributors as well as templates and sample pages will be available on the CIGRE *Centennial website* - see Group Discussion Meetings in the top menu bar.

In case of trouble or any other information is needed, please contact the special reporter ngariboldi@qualitrolcorp.com and/ or the secretary of the study committee frank.richter@50hertz.com .

Authors and WG-convenors who are invited to give a short (ten minutes) presentation of their Report will be informed before **July 30th, 2021**.

The **SC A3 Session (Group discussion meeting)** is scheduled for Tuesday, **August 24th**, in the Salle Bordeaux, at the 3rd level. On the day before the Session (i.e. on Monday, **August 23rd**) **all experts with Prepared Contributions** need to contact the Chairman, the Secretary and Special Reporters of SC A3 at a location in the Palais de Congrès, to be announced by CIGRE Central Office.

During the Session the Chairman may call for spontaneous contributions. Attendees who provide a **spontaneous contribution**, are allowed to deliver a text for the Proceedings. This text is required to be forwarded within a maximum delay of two weeks after the SC A3 Session (thus by Friday **September 10th**, 2021) to ngariboldi@qualitrolcorp.com.

The authors of the SC A3 Session Reports present the results of their studies during the **Poster Session** on Tuesday morning 9:00-12:00, **August 21th, 2021**. If the author(s) cannot attend the Poster Session the National Committee is requested to send a substitute. All SC A3 WGs will present the progress and results so far of their investigations.
For each Report (and each SC A3 Working Group) a monitoring screen will be available to show the poster.
Before **July 30th**, draft posters have to be sent in digital format to wpepper@ausgrid.com.au.
After receiving the draft posters, the Convenor of the A3 Poster session, Wayne Pepper (Australia) will review the readability of the draft posters and inform the authors.

Further Information about the program can be seen by following the Link: https://session.cigre.org/general-programme.