HVDC'21 Jicable

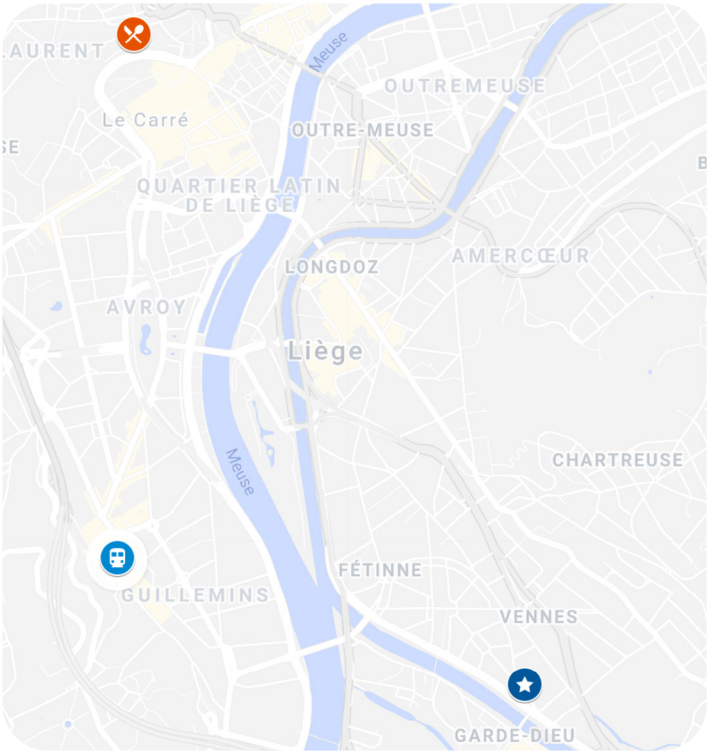
INTERNATIONAL SYMPOSIUM ON HVDC CABLE SYSTEMS

Program

Liège, Belgium

November 8th – 10th, 2021

Location Information



Conference Center
BluePoint Liège

Bd Emile de Laveleye 191
4020 Liège, Belgium

Gala Dinner
Hotel Van der Valk Selys

Rue du Mont St Martin 9/11,
4000 Liège, Belgium

Train Station
Liège-Guillemins

4000 Liège, Belgium

Summary

Organizers and Committees

Organizers

Scientific Supports

International Scientific and Technical Committee

Chairman:

Prof. Dr.-Ing GOCKENBACH Ernst
- University of Hannover, Germany

Secretary:

LESUR Frederic – *NEXANS France, France*

MIREBEAU Pierre – *Consulting, France*

Members :

ADAM Philippe – *CIGRE, France*

ARGAUT Pierre – *Prysmian, CIGRE B1, France*

ARGÜELLES ENJUANES José Manuel – *REE, Spain*

AWAD Ray – *Ray Awad Inc., Canada*

BARBER Ken – *Consulting, Australia*

CASTELLON Jérôme - *Université de Montpellier / CNRS, France*

CHRETIEN Antoine – *RTE, France*

DE WILD Frank – *DNV GL, NL*

DOEDENS Espen – *Nexans, Norway*

DONAGHY Robert – *ESB International, Ireland*

DORN Joerg – *SIEMENS, Germany*

EYSSAUTIER Quentin – *Nexans, Norway*

JEROENSE Marc – *MarCable consulting, Sweden*

KOO Ja-Yoon – *Hanyang University, Korea*

LE DREN Sarah – *SYCABEL, France*

LEEBURN Kieron – *African Cables, SA*

LEEMANS Pieter – *ELIA, Belgium*

LETERME Willem – *KU LEUVEN, Belgium*

LIN Christophe – *ENEDIS, France*

MAMMERI Mohamed – *Prysmian, France*

MARELLI Marco – *Prysmian, Italy*

MIKKELSEN Soren – *Energinet, Denmark*

MOHAUPT Peter – *High Voltage, Austria*

MONTANARI Gian Carlo – *Florida State University, USA*

MOREAU Christophe – *EDF R&D, France*

MORSHUIS Peter – *Solid Dielectric Solutions, Netherlands*

NOSKOV Ivan – *Kirscable, Russia*

NOTHINGER Petru – *Université de Montpellier, France*

ORTON Harry – *Consulting, Canada*

PENSERINI Paul – *RTE, France*

PIETSCH Ralf – *HIGHVOLT, Germany*

RAKOWSKA Aleksandra – *Poznan University of Technology, Poland*

REMY Christian – *Prysmian, France*

SALES CASALS Luis – *Prysmian, France*

SALTZER Markus – *NKT, Switzerland*

SERDYUK Yuriy – *Chalmers Un., Sweden*

SONERUD Bjorn – *Verdilink consulting, Sweden*

TANAKA Hideo – *Furukawa Electric, Japan*

TEYSSEDRE Gilbert – *CNRS, France*

VERCELLOTI Uberto – *CESI, Italy*

WAGNER André – *TenneT TSO GmbH, Germany*

ZENGER Walter – *USI, USA*

ZHANG Dongping – *TenneT TSO GmbH, Germany*

ZHONG Lisheng – *Xi'an Jiantong Un., China*

Steering Committee

President:

TARDIF Laurent – *Sycabel*

Members:

ADAM Philippe – *CIGRE*
ARMAND Philippe – *Sycabel*
BLANOT Marie-Therese – *Sycabel*
DE GROMARD Hugues – *Jicable*
DESCHAMPS Lucien – *AGP 21, Jicable*
FRANCEY Eric – *Sycabel*
GERIN François – *SEE*
LANGLET Guillaume – *Enedis*
PAUMIER Régis – *Jicable*
PAYS Michel – *Jicable*
PROST Jean-Michel – *RTE*
ROUDIL Jean-Philippe – *RTE*
ROUET Francis – *Sycabel*
VALACHS Anne – *SERCE*

Local Committee

BELVAUX Alain – *Siemens*
DE SMEDT Benoit – *BluePoint Liège*
SANCHIS Gerald – *RTE*
VYVEY Patrick – *Nexans*

Organizing Committee

Honorary Chairman:

DESCHAMPS Lucien – *AGP 21, Jicable*

Chairman:

PAUMIER Régis – *Jicable*

Secretary:

CALDERARI Naïma – *Prysmian Group*

Members:

ADAM Philippe – *CIGRE*
ARMAND Philippe – *SICAME Group*
BARBAZANGES Sylvie – *Prysmian Group*
BENAMRAOUI Hania - *Enedis*
CHRETIEN Antoine – *RTE / CNER*
DUBEUX-TORRES Vera – *AGP 21*
EMORINE Marianne – *SEE*
GERIN François – *SEE*
HUNAULT Philippe – *SERCE*
MIREBEAU Pierre - *Jicable*
PAYS Michel - *Jicable*
ROUET Francis – *Sycabel*
SANCHIS Gérald - *SEE*
VYVEY Patrick – *Nexans*
WASILEWSKI Karlee – *SEE*

General Objectives

HVDC power links are growing in numbers and are now increasingly used for land or submarine applications including connection of offshore wind farms. HVDC cable systems are becoming key components of sustainable energy systems to provide large capacity of electricity transmission over long distances, across or between countries and for renewable energy delivery. Recent breakthrough innovations in the field of HVDC extruded cable systems have shown rated voltages reaching the range 400 to 700 kV, power transmission up to 3 GW and suitability not only for VSC converter types, but also for LCC converters.

The objective of the Jicable HVDC'21 International Symposium on HVDC cable systems is to address and discuss the following topics:

1. Conception, design and manufacturing of HVDC cables and accessories: materials, behavior of the materials under DC voltage, space charge interfaces, conception, manufacturing, emerging technologies such as superconductive cables, GIL, standardization, qualification process, …

2. The insertion of HVDC cable systems in the existing UHV networks: insertion of an HVDC cable system in an HVAC existing network, HVDC cable system inserted in an HVDC overhead line system, interaction of several HVDC networks close to HVAC networks.

3. Electric transient overvoltages affecting the cable systems and converting devices: impact on the design of cable systems and protection devices, coordination between cable system and converter stations

4. European and worldwide projects (onshore and offshore, environmental impacts, solutions for high depth projects, electric hubs, mechanical dynamic behavior of submarine cables for energy evacuation of the offshore wind turbines platforms, expected powers and voltages, regulation aspects)

5. Laying and repair methods, fault location systems in the HVDC submarine and land cable area

6. Cost-benefit of the HVDC links (including planification cycle, studies, construction, operation, maintenance, real loading flux versus theorical loading flux defined in the original business plan of the project)

7. Prospective use of MVDC cable systems vs HVDC cable systems

Patronages

Gold Patronages

Prysmian Group

Prysmian Group is world leader in the energy and telecom cable systems industry. With almost 140 years of experience, sales of over €10 billion, about 28,000 employees in over 50 countries and 104 plants, the Group is strongly positioned in high-tech markets and offers the widest possible range of products, services, technologies and know-how. It operates in the businesses of underground and submarine cables and systems for power transmission and distribution, of special cables for applications in many different industries and of medium and low voltage cables for the construction and infrastructure sectors.

For the telecommunications industry, the Group manufactures cables and accessories for voice, video and data transmission, offering a comprehensive range of optical fibres, optical and copper cables and connectivity systems. Prysmian is a public company, listed on the Italian Stock Exchange in the FTSE MIB index.

Nexans
ELECTRIFY THE FUTURE

For over a century, Nexans has played a crucial role in the electrification of the planet and is committed to electrify the future. With around 25,000 people in 38 countries, the Group is leading the charge to the new world of electrification: safe, sustainable, renewable, decarbonized and accessible to everyone. In 2020, Nexans generated 5.7 billion euros in standard sales. The Group is a leader in the design and manufacturing of cable systems and services across four main business areas: Building & Territories, High Voltage & Projects, Industry & Solutions and Telecom & Data. Nexans is the first company of its industry to create a Foundation supporting sustainable initiatives bringing access to energy to disadvantaged communities worldwide. The Group pledged to contribute to carbon neutrality by 2030.

High Voltage
As power demand is predicted to increase by 19% between now and 2030, transmission system operators are fully focused on responding to this fast growing power demand, while meeting increasingly strict environmental and regulatory requirements. As electrification also requires a growing number of advanced, reliable interconnections that can transport more power over longer distances, offshore and onshore, Nexans is committed to make the most challenging generation and transmission projects a success.

General Information

Covid-19

Given the current pandemic situation, all participants will be asked to show proof of vaccination or a negative PCR test at the entry to any activity during the conference. This includes entry in BluePoint, the Gala Dinner, and the Technical Visits. Please have your covid test/ vaccination passes available and on you at all times throughout the symposium.

Note: If you need another Covid test during the conference and/or before traveling:

- **Pharmacie des Vennes**
located on Bd Emile de Laveleye 140, 4020 Liège, Belgium, just around the corner from the symposium. Antigen only. PCR not offered.
Tel: +3243420230
- **Pharmacie Philippet Caprasse**
located at Rue de Fétinne 92, 4020 Liège, Belgium - Tel: +32 4 344 45 40
You must call ahead and the cost is 27 euros.
- **Pharmacie Sacre** - Av. Reine Elisabeth 13, 4020 Liège, Belgium - Tel: +3243434420

Welcome Desk

The Jicable HVDC'21 staff is available to answer any questions/concerns you may have throughout the conference.

The Welcome Desk will be open daily during the entire symposium:

Monday, November 8th : 13:00-18:00
Tuesday, November 9th : 08:00-18:30
Wednesday, November 10th : 08:00-12:00

Badges

Badges are distributed to all participants at the Welcome Desk upon arriving at the conference. You must wear your badge at all times during sessions and conference events so that you can be recognized by staff and other attendees.

Lost and Found

Any item found at BluePoint Liège can be returned to the Welcome Desk.

Cloakroom

Your badge will be requested to drop off your belongings. Computers, devices or valuables will not be accepted. The cloakroom will be open from:

Monday, November 8th : 13:00-21:00
Tuesday, November 9th : 08:00-19:30
Wednesday, November 10th : 08:00-14:00

Wi-Fi

Free Wi-Fi access is available for Jicable HVDC'21 participants at BluePoint Liege.

Taxis

Taxi Reis Liège Navettes Aéroport
+32 499 50 25 02
Taxi Liège : Active taxi à Liège
+32 493 88 88 50

ATM

- **BNP Paribas Fortis Liège-SNCB Liège Guillemins 2**
Pl. des Guillemins 2, 4000 Liège, Belgium
Location: 2.2 km Blue Point Liège
28 minute walk (at the railway station)
- **Belfius – Liège Fetinne**
Bd Emile de Laveleye 47, 4020 Liège, Belgium
Location: 950 meters from BluePoint Liège
12 minute walk

No smoking policy

Please remember that there is a no smoking policy while inside the conference venues.

Official Language

The official language of Jicable HVDC'21 is English.

Insurance

The Organizers cannot be held responsible for accidents or damage to participants or loss of their personal property howsoever caused.

Welcome Cocktail

The welcome cocktail is included in the registration fees and will take place on: **November 8th**, 2021 from 19:00 to 21:00 at BluePoint Liège.

Jicable HVDC'21 Options

TUTORIALS

TUTORIAL 1

Technical conception and design considerations for ensuring high availability of giant HVDC land cable connections

André WAGNER,
TenneT TSO, Germany

Markus HABEL,
50Hertz Transmission, Germany

Jan BRÜGGMANN,
Amprion, Germany

Executive summary: In Germany the transmission grid expansion plans contain the implementation of so-called HVDC onshore corridor connections in order to fulfill the climate targets while shutting down nuclear power plants until 2022. These corridor connections will each have a route length of 300 km to 700 km and a transport capacity of 2 GW. Consequently they are to be considered as the future backbone of the German transmission grid, thus high availably is the driving requirement. With respect to public acceptance of such giant projects, power cables will be the majorly applied power line technology. This leads to the necessity of reconsideration of known technical conceptions and designs for HVDC cable systems.

In this workshop innovative approaches for the new and enhanced challenges with regard to ensuring high availability of giant HVDC land cable connections are addressed. It covers the implementation of auxiliary infrastructure, the use of cable monitoring systems and the discussion on new testing requirements.

Auxiliary infrastructure such as cable segmentation stations, cable-OHL transition stations, intermediate station for fibre-optic based systems and accessible linkboxes represent approaches from a system point of view that serve as enablers for availability optimized operation and maintenance of the HVDC cables. Monitoring systems allowing online cable fault locations or online cable condition assessments represent distinct measures for availability optimized operation which require special preconditions for applicability on super-long cable systems. New test requirements in both the cable production and the installation phase arise from a quality assurance (QA) point a view due to new or enhanced technical challenges such as the huge amount of joints to be assembled or new electrical stress conditions. However, innovative testing approaches need to be sketched not only with respect to their QA purpose but economic aspects and possible impacts on the project progress must also be taken into account.

TUTORIAL 2

Current stage and perspectives of studies and simulations on TOV affecting HVDC link

Hani SAAD,
RTE, France

Markus SALTZER,
NKT, Switzerland

Executive summary: Application of voltage source converters (VSCs) in power systems is rapidly growing due to advantages such as absence of commutation failures, ability of independently controlling active and reactive power, and fast dynamic response. VSC based on Modular Multilevel Converter (MMC) topology has become the most attractive solution, mainly due to their higher performances and lower cost compared to early VSC implementations.

MMC technology does not require the inversion of the voltage polarity when reversing the power flow direction. This has made the utilization of extruded insulation cables (XLPE) easier for DC applications. Since then, the number of extruded insulation cables, used in combination with VSCs, has increased for HVDC power transmission applications. Even if VSC does not require the inversion of the voltage polarity (during normal operation), several events can cause transients on cables that are not covered by standard tests. To fill this gap, an ongoing CIGRE JWG B4/B1/C4.73 investigates surges and extended overvoltage testing for DC cable systems to provide recommendation for upcoming HVDC projects and improve cable testing standards.

Circuit configuration of a converter station can vary depending on project specification and selected manufacturer. Therefore, the impact of MMC station's transients on DC cable are evaluated during the design phase of each HVDC project.

DC transients (i.e. overvoltage and overcurrent) during converter faults leads to non-linear behavior and, thereby, are difficult to predict using analytical tools. Therefore, EMT simulations are commonly used to compute the overvoltage transients because these provide the most accurate and reliable results.

This workshop explains the typical events that lead to voltage fluctuation on cables connected to VSC converters such as DC faults or internal converters faults. In addition, the impact of converter parameters on the DC transient within the cable is provided an overview on the sensitivity of the system. Finally, technical solutions to limit stresses on cables are proposed and discussed. ●

TUTORIAL 3

Scientific challenges and threats in the HVDC transmission systems (cables, accessories, converter devices)

Gilbert TEYSSEDRE,
Toulouse University, France

Petru NOTINGHER,
IES Montpellier, France

Seddik BACHA,
G2ELab, France

Martin HENRIKSEN,
SuperGrid Institute, France

Executive summary: Energy experts agree that the current transmission system must address new requirements for hosting huge quantity of renewables and need to be adapted to meet the new quantity and quality of demand. There are two main visions: enhancing the existing HV AC grid or building a new HVDC grid in parallel to the existing one. Either way, power electronics will play a critical role in the development and operation of the future power grid.

Power electronics devices make it possible to control energy flow through optimal pathways, to interconnect non-synchronized areas, to transfer energy via long distances and create large subsea interconnections. However, these same devices may affect grid stability and protection and devices. The cables are directly affected and must be designed in consequence.

In this context, the stresses driven by the HVDC cable conditions and construction on the dielectric materials constituting cables and accessories will be addressed in this workshop. Besides the questions of controlled over-stresses driven by qualification/type tests and operation with polarity reversals, HVDC cables are submitted to uneven stresses resulting from the interaction with the network. Based on typical HVDC technology, our purpose will be to identify such stresses induced by converters, linked to over-currents or over-voltage during operation or failure, or to ac/dc network coupling, and how far it could impact cable insulation.

On the material side, physical processes and governing rules considering field distribution under DC stress, and space charge effects in synthetic insulations, will be reviewed as well as methods to probe these phenomena. The challenges for materials with going to very high voltage will be addressed, considering both static and dynamic stresses as well as physical phenomena likely to be at play. Some solutions proposed to improve material endurance will be discussed.

TUTORIAL 4

Recommendations for testing HVDC cables systems for power transmission including 800 kVdc

Stefano FRANCHI BONONI,
Prysmian Group,
Italy

Gunnar EVENSET,
Power Cable Consulting,
Norway

Executive summary: The decision to activate Working Group B1.62 for extruded DC cable systems and B1.66 for lapped DC cable systems stems from the fact that commercially available HVDC systems above 500 kV were emerging with both laminated (even new kind of laminated) and extruded insulations. In fact, at the time of preparing these recommendations there was laboratory experience at voltages up to 800 kV and operating experience already at 400 kV for extruded and 600 kV for laminated insulation; during the preparation of the recommendations, contracts for extruded cable systems with voltage level at 525kV were also awarded. A further increase in voltage level is to be expected and these recommendations will therefore cover voltages up to 800 kV. The test recommendations for lapped insulation published in Electra 189 and Electra No. 218 were already valid for voltage levels up to 800 kV, but a revision of the test criteria was necessary to reflect current and future HVDC system technology and to merge the recommendations into one technical brochure.

Furthermore, the Working Groups had to give clear answers to several questions that emerged with the testing and operational experiences gained in the past 10-20 years on HVDC cable systems.

The large number of projects and the quick development needed by the industry to match the demand of always more performing HVDC systems requires commonly shared and agreed testing method to speed up the time to market of technology solutions. The already well-known Prequalification and Type test protocols were reviewed and integrated when needed with suggestions and improvements. In particular, the heating method, temperature control and thermal test parameters had to be reviewed for extruded insulation.

•••
cont'd

TUTORIAL 4

•••

Extension of qualification test was introduced for extruded insulations, trying to mirror as much as possible what already defined in TB 303 for AC cable systems.

Prequalification test and Extension of qualification test were also introduced for lapped insulations to give guidance for qualification of new materials or major changes in operating conditions.

A proposal to standardize qualified voltage levels (nominal and maximum) was introduced, after collecting field experience also in cooperation with SC B4.

More flexibility was introduced allowing for different test methods (like impulse test configuration with both blocking capacitor and sphere gaps method), leveraging on the significant test experiences cumulated by the industry.

The emergence of new grid configurations (point-to-point, radial and meshed) and development in converter technology are introducing new types of overvoltages (commonly referred to as Temporary Overvoltages, TOVs) and the standard switching and lightning impulse wave shapes might not cover typical voltage stresses anymore. Thanks to the interface with JWG B4/B1/C4.62, the new waveshapes were evaluated and new testing methods are now included in these Technical Brochures.

The new manufacturing and testing experience cumulated for systems with extruded insulation by the industry when supplying more than 6000 km of HVDC cables (at present) allowed also to review the routine and sample testing previously outlined in the Technical Brochure 496 and to define more precise criteria, test regimes and test methods. Test recommendations were given about how to routine test cables and accessories, trying to align as much as possible with IEC 62895 if possible, considering the different voltage levels the two documents. An extensive work was done, mainly on sample tests, to introduce new fingerprinting methods and to open the testing to new types of materials which are now being proposed and purchased in the market, such as polypropylene laminated, low cross-linked polyethylene, nano-filled materials and thermoplastic insulations. ●

Gala Dinner

This year's gala dinner will be held in the beautiful, historic Hotel Van der Valk Selys. Located in the cultural and commercial heart of the "cite ardente" or "fiery city", Hotel Selys' history and architecture is a unique backdrop for the Jicable "soiree". The architecture of this U-shaped building is designed around a central core that dates from the 15th century and has been renovated and expanded over the centuries.

DATE

Tuesday, November 9th, *20:00 - 23:00*

LOCATION

Rue du Mont St Martin 11, 4000 Liège, Belgium

Photo from: Hotel Van der Valk Selys

MEETING POINT

19:30 in front of BluePoint Liège

Buses will be provided to and from the gala dinner for those who have purchased a gala dinner ticket which you will present with your badge.

Technical Visits

TECHNICAL VISIT 1:
ALEGrO Project

Belgium's Elia and Germany's Amprion are developing the Aechen Liege Electricity Grid Overlay (ALEGRO) project that will be the first interconnector between the two countries. The project will involve higher import and export capacities between Belgium and Germany as well as the effective integration and circulation of renewable energy. It will also create broader competition on the electricity market while benefiting companies and the community and downward pressure on energy prices by promoting opportunities for energy exchanges between neighboring countries.

DATE

Wednesday, November 10th, *13:30 – 18:00*

LOCATION

4600 Vise – Rue des Trois Fermes Lixhe – ALEGrO Elia

The visit is reserved for participants who register for it

Photo from: ALEGrO

MEETING POINT

13:30 in front of Blue Point Liege

A bus service will be provided to and from the technical visit. As it is the last day of the conference, you may keep your suitcases with the bus during the visit if you desire.

TECHNICAL VISIT 2:

EnergyVille

EnergyVille is a collaboration between the research partners KU Leuven, VITO, imec and UHasselt in the field of sustainable energy and intelligent energy systems. Our researchers provide expertise to industry and public authorities on energy-efficient buildings and intelligent networks for a sustainable urban environment.

Fields of interest:

- **Solar**
- **Storage**
- **Networks :** HVDC systems for meshed networks / Interoperability and decision support for grid operators / MV poly-phase grid sensorics / ...
- **Power control and conversion :** New materials / compact power convertors / DC unipolar and bipolar nanogrids / Energy conversion
- **Buildings and districts**
- **Strategies and markets**

DATE

Wednesday, November 10th, *13:30 – 18:00*

LOCATION

3600 Genk, Thor Park 8310, EnergyVille 1

The visit is reserved for participants who register for it

Photo from: EnergyVille

MEETING POINT

13:30 in front of Blue Point Liege

A bus service will be provided to and from the technical visit. As it is the last day of the conference, you may keep your suitcases with the bus during the visit if you desire.

Touristic Visit Liege City Center

You will explore the city's neighborhoods, monuments and museums: for example the Grand Curtius and its interior courtyards, and the Saint-Barthélemy collegiate church. You will pass the rue Hors-Château, a historic heritage site known for its buildings and its dead ends. There is also the Place du Marché and the Perron, the town hall, the palace of the prince-bishops, etc. ... In the old district of the Island, while discovering the opera house and the multiple performance halls, you will stroll through the pedestrian streets of the Carré lined with shops and you will enjoy the atmosphere there before heading to Saint Paul's Cathedral and its splendid Gothic cloister. NOTE: The tour is in English.

DATE

Wednesday, November 10th, 2021

MEETING POINT

14:00 at Place de la République Française
4000 Liège, Belgium

The visit is reserved for participants who register for it.

NOTE: Take the Bus line 31 from LIEGE Rue Stappers (2-minute walk from BluePoint) straight to LIEGE République Française. It is about a 20-minute trajectory.

Photos from: Visite Liège

Conference Replays

Video Replays for each session, as well as the tutorials, are available for purchase. They will allow you to watch the conference sessions for up to 6 months after Jicable HVDC'21.

The replays will be available on the virtual platform following the conference sessions.

Please contact the organizers if you wish to have access to the replays.

Technical Program

Program - at - a - glance

	Monday, November 8th	Tuesday, November 9th	Wednesday, November 10th
09:00		Opening Ceremony	**Session 5:** Cable system testing and test results
09:15			
09:30			
09:45		**Session 1:** Conception, design, manufacturing of all types of HVDC cables and accessories/materials	Coffee Break
10:00			**Session 6:** European and worldwide onshore and offshore projects
10:15			
10:30			
10:45			
11:00		Coffee Break	
11:15			
11:30		**Session 2:** Conception, design, manufacturing of all types of HVDC cables and accessories/materials	
11:45			Closing Ceremony
12:00			
12:15			
12:30			Lunch Break
12:45		Lunch Break	
13:00	Registration Desk		
13:15			
13:30			
13:45			

14:00	**Tutorials** **T1:** ROOM A **T3:** ROOM B		**Session 3:** The different aspects related to the insertion of HVDC cable systems in an existing UHV network	**Technical Visits :** **V1 - ALEGrO** - Lixhe, Belgium **V2 - EnergyVille** - Genk, Belgium **Touristic Visit :** Liège City Center
14:15				
14:30				
14:45				
15:00				
15:15			**Coffee Break**	
15:30				
15:45				
16:00	**Coffee Break**		**Session 4:** Electric transient overvoltages affecting the cable systems and converting devices in operation - MVDC applications	
16:15				
16:30	**Tutorials** **T2:** ROOM A **T4:** ROOM B			
16:45				
17:00			**Young Researchers Poster Session**	
17:15				
17:30				
17:45				
18:00				
18:15				
18:30		**Welcome Cocktail**		
18:45				
19:00			**Gala Dinner and Young Researchers Awards**	
20:00				
21:00				
22:00				
23:00				

Program updated on October 27th, 2021. All changes beyond this date are updated on the website.

MONDAY, NOVEMBER 8TH

14:00–16:00

ROOM A

T1 Technical conception and design considerations for ensuring high availability of giant HVDC land cable connections
by André WAGNER, TenneT TSO, Germany - Markus HABEL, 50Hertz Transmission, Germany - Jan BRÜGGMANN, Amprion, Germany

ROOM B

T3 Scientific challenges and threats in the HVDC transmission systems (cables, accessories, converter devices)
by Gilbert TEYSSEDRE, Toulouse University, France - Petru NOTINGHER, IES Montpellier, France - Seddik BACHA, G2ELab, France - Martin HENRIKSEN, SuperGrid Institute, France

16.00 – 16.30
COFFEE BREAK

16:30–18:30

ROOM A

T2 Current stage and perspectives of studies and simulations on TOV affecting HVDC link
by Hani SAAD, RTE, France - Markus SALTZER, NKT, Switzerland

ROOM B

T4 Recommendations for testing HVDC cables systems for power transmission including 800 kVdc
by Stefano FRANCHI BONONI, Prysmian Group, Italy - Gunnar EVENSET, Power Cable Consulting, Norway

19.00 – 21.00
WELCOME COCKTAIL
BluePoint, Liège

TUESDAY, NOVEMBER 9TH

9.00 – 9.45
OPENING CEREMONY

9.45 – 11.00

Session 1 **Conception, design, manufacturing of all types of HVDC cables and accessories/ materials**
Chairman: *Paul PENSERINI (RTE-France)*
Rapporteur: *Servane HALLER (Supergrid Institute – France)*

1.1. High voltage DC: from innovation to operation
by Ramona HUUVA, from Borealis, Sweden

1.2. Emerging material technology in HVDC cable insulation
by Liang ZHONG, Xi'an Jiaotong University, China

1.3. Design topic as filled-type DC XPLE supplier
by Shoji MASHIO from Sumitomo Electric, Japan

1.4. Evolution of leakage currents during HVDC prequalification tests
by Espen DOEDENS from Nexans, Norway

11.00 – 11.30
COFFEE BREAK

11.30 – 12.45

Session 2 **Conception, design, manufacturing of all types of HVDC cables and accessories/ materials**
Chairman: *Marco MARELLI (Prysmian Group - Italy)*
Rapporteur: *Michel PAYS (Jicable – France)*

2.1. Methodology for research and development of HVDC accessories with emphasis on research results of material characterization and its use for FEA modelling
by Ivan JOVANOVIC, Director Engineering Specialty Products, G&W Electric, USA

2.2. Space charge measurement techniques to evaluate insulating materials for HVDC cables
by Yasuhiro TANAKA, Tokyo City University, Japan

2.3. Design of 400 kV and 525 kV DC accessories and system qualification with focus on Twin-plug
by Paolo BOFFI, Prysmian Group, Italy - Mohamed MAMMERI, Prysmian Group, France

2.4. Full scale cable degassing study on baskets and drums
by Markus JARVID, Nexans, Norway

12.45 – 14.00
LUNCH BREAK

14.00 – 15.15

Session 3 **Session 3: The different aspects related to the insertion of HVDC cable systems in an existing UHV network**
Chairman: *Dr Roland Dongping ZHANG (Tennet – Germany)*
Rapporteur: *Yannis CORLU (RTE-France)*

3.1. Influence of voltage transients on the evolution of partial discharges and their harmfulness in HVDC cables
by Hadi NADERIALLAF, Paolo SERI, LIMES University of Bologna, Italy - Gian Carlo MONTANARI, Center for Advanced Power Systems (CAPS) of the Florida State University at Tallahasse, USA

3.2. Transient overvoltage stresses caused by faults in HVDC cable systems and their simulation in the laboratory
by Dr. Heiko JAHN, Kema Labs, Germany

3.3. Parallel operation of two VSC-HVDC links with grid forming controls
by Sébastien DENNETIÈRE et alii, RTE, France

3.4.Solutions for the step-wise development of HVDC-based high power corridors
by Serge POULLAIN, Joan Sau BASSOLS, Supergrid Institute, France

15.15 – 15.45
COFFEE BREAK

15.45 – 16.45

Session 4 **Electric transient overvoltages affecting the cable systems and converting devices in operation - MVDC applications**
Chairman: *Uberto VERCELOTTI (CESI SpA – Italy)*
Rapporteur:*(to be nominated)*

4.1. Return of experience on IFA2000 LCC 270 kV
by Mohamed MAMMERI, Prysmian Group, France

4.2. Application of new high temperature ducts on IFA2 interconnector
by Serge HASCÖET and Yann DELANNE, RTE, France, - J. MANSON and Jose SANTANA, Prysmian Group

4.4. On the specificities of medium voltage cable systems for DC applications
by Martin HENRIKSEN, Ludovic BOYER, Supergrid Institute, France

17.00 – 19.00
YOUNG RESEARCHERS POSTER SESSION:

Topic 1 New materials for HVDC cable systems and converter devices

6. Effect of dicumyl peroxide content on DC dielectric performance and mechanical behavior of crosslinked polyethylene-polystyrene composite
by Liang CAO

9. Research on the applicability of a new XLPE material for 500kV HVDC cable operating at 90°C
by Li FEI

17. Polymer nanodielectrics with antioxidant grafted nanosilica: the effect of interfaces on DC electrical performance
by Simone Vincenzo SURACI

21. High-performance polypropylene-based insulating material for HVDC cable by styrene-grafting and blending modification
by Shixun HU

Topic 2 Materials (cables and accessories) characterization (electric, physical and chemical)

4. Study of the electrical properties of HVAC EPDM and HVAC silicone rubber under DC constraint
by Maya MOURAD

18. The effect of degassing times on electrical properties of XLPE insulation for 525kV DC submarine cable
by Gong HAWK

29. Simulation and Experimental Investigation of Maximum Power Transfer Capability of HVDC Cables
by Sathyamoorthy DHAYALAN

Topic 3 Physical phenomena associated with interfaces

7. Influence of lubricant on charge transport dynamics in multilayer dielectrics
by Isabella NETT

Topic 4 Space charge measurements (interfaces and materials)

12. Space Charge Measurement of Full-size 23-mm-thick XLPE Cables in Load-cycle Condition
by Shosuke MORITA

22. Observation of Space Charge Accumulation Behavior Under High Speed Voltage Polarity Reversal
by Naoki KIRIGAYA

24. Non-intrusive space charge measurement on DC cable using the thermal step method
by Mourad JEBLI

26. Influence of voltage rise rate for DC breakdown test on space charge accumulation characteristics.
by Morikawa KOKI

31. PD Behaviour of XLPE with successive stress of MVAC and MVDC
by Johanna LINKE

Topic 5 Ageing and reliability

8. Experimental Investigation of Influences on the Long-Term Performance of Bedding Materials for Buried Power Cables
by Maximilian SCHMID

11. Life Assessment of the HVDC Converter Transformer Insulation and Cable Insulation under Composite Voltages
by Birender SINGH

16. Review of IEC 62895 regarding electrical type tests on extruded MVDC Cable Systems
by Patrik RATHEISER

28. Qualification Tests for Partial Discharge Instruments to be used for Insulation Condition Monitoring of HVDC Cable Systems
by Eduardo ARCONES DEL ÁLAMO

Topic 6 Simulation and digital models

13. Modeling the effect of repetitive voltage transients in HVDC cables: the contribution of polarization mechanisms to the electric field dynamic
by Pasquale CAMBARERI

Topic 7 Transient overvoltage (TOV) studies and models

No poster

Topic 8 Static and dynamic mechanical studies on cable systems

No poster

Topic 9 Emerging HVDC fully insulated transmission systems

1. Development of the first set of ± 535kV DC cable accessories base on SiR for Zhangbei VSC-HVDC Cable System
by Mingyu ZHOU

20:00 – 23.00

GALA DINNER
Hotel Van der Valk Selys

WEDNESDAY, NOVEMBER 10TH

9.00 – 9.45

Session 5 **Cable system testing and test results**

Chairman: *Uberto VERCELOTTI (CESI- SpA – Italy)*
Rapporteur: *William BELE (RTE-France)*

5.3. Preliminary results on investigational chopped impulse test on HVDC cable systems,
by Pierre HONDAÂ - P. PRIEUR, RTE - Gregorio DENCHE, José-Manuel ARGUELLES, REE, Abel FUSTIER, Nicola GUERRINI, F. PADILLO, Lluis-Ramon SALES, Prysmian Group

5.4. Towards defining new requirements for dynamic stress testing of HVDC cable systems up to 525 kV
by Tanumay KARMOKAR, Dr. Roland Dongping ZHANG, TenneT TSO GmbH, Germany, Kees KOREMAN, Robert-Jan de BES, TenneT TSO BV, The Netherlands

9.45 – 10.15
COFFEE BREAK

10.15 – 11.30

Session 6 **European and worldwide onshore and offshore projects**

Chairman: *Pieter LEEMANS (Elia - Belgium)*
Rapporteur: *(to be nominated)*

6.1. Allegro Project
by Bart MAMPAEY, from Elia, Belgium, Daniel WINKEL, from Amprion, Fabian Charles and Mohamed Mammeri, from Prysmian Group, France

6.2. Impact of HVDC grid protection on DC cable transients
by Willem LETERME, Dirk Van HERTEM, Mudar ABEDRABBO, Mian WANG, Geraint CHAFFEY from KU Leuven/EnergyVille, Belgium

6.3. HDVC underground interconnection 525 kV DC solutions
by Stefano COTUGNO and Giovanni POZZATI, from Prysmian Group, Italy

6.4. HVDC-solutions in interconnector systems: a) the first offshore interconnector in the Baltic Sea by linking two national offshore wind farm connections; b) upgrading an existing interconnector system with LCC converters by a cable with extruded insulation; c) options for cable section stations in new interconnections to enable reduced outage times
by Marie-Christine SCHIMMELMANN, Frank RICHTER and Clemens UNGER, 50Hertz Transmission GmbH, Germany

11.30 – 12.30
CLOSING SESSION

Global interconnection for a sustainable electricity system: CIGRE's vision
by Gerald SANCHIS, CIGRE C1.44, France, Nicolas CHAMOLLET, CIGRE C1.44, France, and Antonio ILICETO, CIGRE C1.44, Italy

Round table
Gerald SANCHIS, *CIGRE C1.44, France*
Damien ERNST, *Université de Liège, Belgium*
Bo YIN, *GEIDCO, China*
To be determined, *50hertz, Germany*
Olivier GRABETTE, *RTE, France*
Paulo ESMERALDO, *State Grid, Brazil*

12.30 – 13.30
LUNCH BREAK

13.30 – 18.30
TECHNICAL VISITS

Technical Visit 1: ALEGrO Project (Lixhe) – *departure from BluePoint Liège*
Technical Visit 2: EnergyVille (Genk) – *departure from BluePoint Liège*

What is Jicable?

Jicable is an international forum for the exchange of information in the fields of research, industrial development, installation, operation and diagnoses relating to insulated power cables and their accessories from low voltage and special cables up to ultra high voltage cables and new technology cables. The tenth Jicable conferences and Jicable HVDC Symposiums held between 1984 and 2019 were very useful to the following segments of the cable industry: researchers, engineers, decision-makers, raw materials suppliers, manufacturers, consultants, installers and users.

In fact, insulated power cables are increasingly used in electric power transmission and distribution networks. This is due to the significant progress achieved in the development of new technologies with higher performances and motivated by increasing environmental pressure. Cables are recognized as a reliable means for the transmission and distribution of electrical energy. Jicable conferences and Symposiums allow in-depth analysis of the State-of-the-Art and future perspectives : new materials, evolution in technologies, manufacturing process, maintenance policies and condition assessment, upgrading, refurbishment, lessons learnt from service, dielectric phenomena, thermal and thermo-mechanical behavior… new innovative technical solutions for high power transmission: new superconductive materials as well as a closer look at major submarine cable projects connecting High Voltage networks in many countries.

Jicable
SINCE 1982

Follow us on:

Jicable *Jicable_asso*

Notes

JICABLE HVDC'21 VIRTUAL PLATFORM

This year's edition is a hybrid event.

All registered participants of Jicable HVDC'21 Symposium have access the virtual platform via laptops, smartphones or tablets.

Log into the Jicable HVDC'21 virtual platform on AccelEvents using your event registration email address:

On the virtual platform, you will find:

Proceedings

Proceedings are available for download on the virtual platform.

Young Researchers Poster Session

You will be able to watch their representations and connect with the Young Researchers to ask them questions.

Networking Opportunities

All participants, virtual and in-person, have the possibility to connect and chat with one another throughout the entire conference.

Conference Replays

The video replays for the conference will be available on the virtual platform to anyone who purchased them previously during 6 months. Reminder: virtual participants have replays included in their registration fees.

...and even more!

Liège, Belgium
November 8th – 10th, 2021

www.hvdc21.jicable.org