CIGRE-IEC 2016 Colloquium on EHV and UHV (AC & DC)

Hotel Bonaventure Montréal
Montréal, QC, Canada • May 9-11, 2016 • www.cigre-hv.ca

Hosted by:

Hydro Québec

Colloquium Program

ABB RTDS Technologies SEDIVER

OPAL-RT TECHNOLOGIES Megger Electric Energy T&D MAGAZINE

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General Information

WELCOME MESSAGE FROM CONFERENCE CHAIR

Recently, the electric power system has been undergoing remarkable changes, which are expected to continue in the years to come. The progressive liberalization of the electricity markets on the one hand and the unprecedented—and for many unforeseeable—penetration of renewables into the grid promises profound changes. On the consumer end, dispersed generation and bidirectional power flow will boost the development of what is generally referred to as the "smart grid". But also on the transmission side, there is growing mention of so-called "mega grids" that will have to be put in place in order to satisfy the ever increasing demand for electric power, but also in order to bridge the sometimes substantial distances between remote generation sites of renewable energy sources and consumers, not to mention the necessity of establishing interconnections between countries in the wake of the increased opening up of electricity markets. No wonder then that EHV and UHV grids have been greatly expanding over the past few years and are therefore attracting significant interest from the power community.

In this context, the 2nd International Colloquium on EHV and UHV in association with CIGRE and IEC will bring together key players in the electric power systems sector: transmission and substation engineers, generation engineers, system operators, designers, manufacturers, erection agencies, regulators, research institutions, testing laboratories and universities. The colloquium is a unique forum in which to share exciting new research and breakthroughs, raise issues or questions, discuss future directions, and network with leading professionals from all over the world. A technical visit to Hydro-Québec's research institute (IREQ) will round out the conference program.

It is my great pleasure and privilege to invite you to participate in this exciting forum, which will take place in the vibrant city of Montréal and is graciously being hosted by IREQ and supported by CIGRE Canada. As already mentioned, the colloquium will offer you a unique opportunity to be updated on new technical developments in the EHV and UHV field while, at the same time, meeting your peers and renewing old acquaintances and making interesting new contacts.

Very much looking forward to seeing you in Montréal in May 2016,

Dr. Ing.-habil. Konstantin O. Papailiou
Conference Chair
Chairman CIGRE Study Committee B2 (Overhead lines)

COMMITTEES

Technical Committee

Konstantin O. Papailiou, Chairman, CIGRE SC B2
Claude Rajotte, Chairman, CIGRE SC A2
Hiroki Ito, Chairman, CIGRE SC A3
Terry Krieg, Chairman, CIGRE SC B3
Pouyan Pourbeik, Chairman, CIGRE SC C4
Josef Kindersberger, Chairman, CIGRE SC D1
Uwe Riechert, Convener, CIGRE AG D1.02
Eiichi Zaima, Convener, IEC TC 28
Marcus Haeusler, Chairman, IEC TC 115
Kyoichi Uehara, Assistant Secretary, IEC TC 122
Alberto Oscar, Tesmec S.p.A.
Innocent Kamwa, Hydro-Québec (IREQ)
Rick Spyker, AltaLink Management Ltd, Canadian Representative CIGRE SC C2
Patrick Picher, Hydro-Québec (IREQ)
John McNichol, Manitoba Hydro (HVDC Division), Canadian Representative CIGRE SC B4
David Elizondo, Quanta Technology
Joon-Young Park, Korea Electric Power Corporation (KEPCO)
Mark Stemmle, Nexans Deutschland GmbH
Serge Montambault, Hydro-Québec (IREQ)
Michael Fourman, Georgia Transmission Corp.
Masoud Farzaneh, UQAC

Organizing Committee

Pierre Van Dyke, Hydro-Québec (IREQ), Canadian Representative CIGRE SC B2
Violaine Dorval, Hydro-Québec (IREQ)
Jean-François Allan, Hydro-Québec (IREQ)
Jean-Pierre Tardif, Hydro-Québec (IREQ)
Marc Lafleur, Hydro-Québec
Suzanne Lafrenière, CIGRE Canada
Steven Desrochers, Jaguar Media

CONFERENCE VENUE

Contact Information

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Montréal, Québec H5A 1E4
Canada
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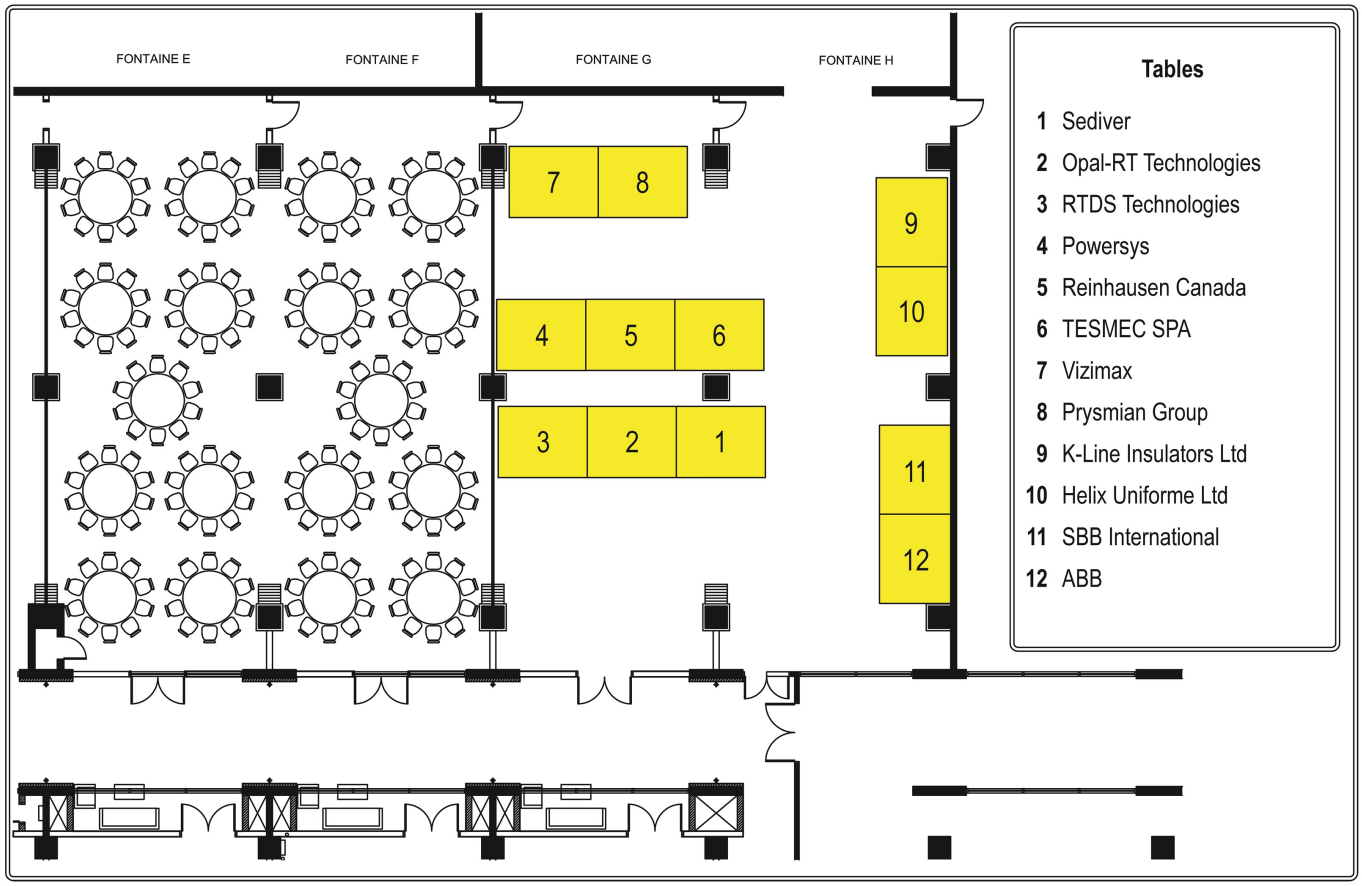
Floor Plan



WEEK-AT-A-GLANCE

<table>
<tr><th colspan="6">May 2016</th></tr>
<tr><th></th><th>Sunday 8th</th><th colspan="2">Monday 9th</th><th colspan="2">Tuesday 10th</th><th>Wednesday 11th</th></tr>
<tr><td rowspan="5">Morning</td><td rowspan="2"></td><td colspan="2">Registration and Breakfast
(7:00 – 8:00)</td><td colspan="2">Registration and Breakfast
(7:00 – 8:00)</td><td rowspan="2">Shuttle bus from the hotel
(8:45)</td></tr>
<tr><td colspan="2">Opening Plenary (8:00 – 9:00)</td><td colspan="2">Plenary (8:00 – 9:00)</td></tr>
<tr><td colspan="2">Networking Break (9:00 – 9:30)</td><td colspan="2">Networking Break (9:00 – 9:30)</td><td rowspan="3">Technical Visit ***
Hydro-Québec's research institute
(Return by bus to the hotel around 13:00)
  </td></tr>
<tr><td>→ Session 1A
(9:30 – 10:30)
4 x 15 minutes</td><td>→ Session 1B
(9:30 – 10:30)
4 x 15 minutes</td><td>→ Session 5A
(9:30 – 10:45)
5 x 15 minutes</td><td>→ Session 5B
(9:30 – 10:30)
4 x 15 minutes</td></tr>
<tr><td colspan="2">Networking Break (10:30 – 11:00)</td><td colspan="2">Networking Break (10:45 – 11:15)</td></tr>
<tr><td rowspan="3">Noon</td><td rowspan="5">Registration
(11:00 – 18:00)

Exhibitor Setup
(11:00 – 18:00)</td><td>→ Session 2A
(11:00 – 12:00)
4 x 15 minutes</td><td>→ Session 2B
(11:00 – 12:00)
4 x 15 minutes</td><td>→ Session 6A
(11:15 – 12:15)
4 x 15 minutes</td><td>→ Session 6B
(11:15 – 12:15)
4 x 15 minutes</td><td rowspan="3"></td></tr>
<tr><td colspan="2">Lunch (12:00 – 13:30)</td><td colspan="2">Lunch (12:15 – 13:30)</td></tr>
<tr><td rowspan="3">Afternoon</td><td>→ Session 3A
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6 x 15 minutes</td><td>→ Session 3B
(13:30 – 15:00)
6 x 15 minutes</td><td>→ Session 7A
(13:30 – 15:00)
6 x 15 minutes</td><td>→ Session 7B
(13:30 – 15:00)
6 x 15 minutes</td></tr>
<tr><td colspan="2">Networking Break (15:00 – 15:30)</td><td colspan="2">Networking Break (15:00 – 15:30)</td></tr>
<tr><td>→ Session 4A
(15:30 – 17:00)
6 x 15 minutes</td><td>→ Session 4B
(15:30 – 17:00)
6 x 15 minutes</td><td colspan="2" rowspan="2">Plenary and
Closing Words
(15:30 – 16:30)</td></tr>
<tr><td rowspan="2">Evening</td><td colspan="2">Cocktail Reception
(17:00 – 19:00)</td></tr>
<tr><td>Welcome Reception
(18:00 – 20:00)</td><td colspan="2">Banquet
(19:30 – 22:00)</td><td colspan="2"></td></tr>
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Sessions 1A to 7A, Opening Plenary, Plenary and Closing Words, Banquet: Verdun (Verdun/Lachine/Lasalle) Room [simultaneous interpretation service available]
Sessions 1B to 7B: Fontaine D Room
Exhibition, Networking Breaks and Cocktail Reception: Fontaine GH Room
Lunch: Fontaine EF Room

*** **Registration for the Technical Visit: www.cigre-hv.ca/2016/en/technical-visit/**

PLENARIES

OPENING PLENARY

MONDAY, MAY 9TH (8:00-9:00)

Plenary Chair: Konstantin Papailiou, Conference Chair

8:00-8:05 **Pierre Van Dyke, Organizing Committee Chair**

8:05-8:15 **Konstantin Papailiou, Conference Chair**

8:15-8:35 **Élie Saheb, Executive Vice President – Corporate Development, Strategic Planning and Innovation, Hydro-Québec**

8:35-9:00 **Klaus Froehlich, President, CIGRE**

PLENARY

TUESDAY, MAY 10TH (8:00-9:00)

Plenary Chair: Konstantin Papailiou, Conference Chair

8:00-8:10 **Hiroki Ito, Chairman, CIGRE SC A3**

8:10-8:15 **Claude Rajotte, Chairman, CIGRE SC A2**

8:15-8:40 **« 50 years of 735 kV at Hydro-Québec »**
François Lévesque, Network Study Manager, Hydro-Québec
Stéphane Talbot, Network Management and Planning Manager, Hydro-Québec

8:40-9:00 **Greg Farthing, Vice President Sales and Marketing – Power Products and Systems, ABB Canada**

PLENARY AND CLOSING WORDS

TUESDAY, MAY 10TH (15:30-16:30)

Plenary Chair: Konstantin Papailiou, Conference Chair

15:30-16:15 Overview of the technical sessions and panel discussion
Konstantin Papailiou, Chairman, CIGRE SC B2
Pierre Van Dyke, Convener CIGRE AG 06 and Canadian Representative CIGRE SC B2
Hiroki Ito, Chairman, CIGRE SC A3
Claude Rajotte, Chairman, CIGRE SC A2

16:15-16:20 On the road toward 2019 CIGRE-IEC Colloquium in Japan
Pierre Van Dyke, Violaine Dorval, Jean-François Allan, Hiroki Ito

16:20-16:30 Prize Draw

SESSION 1A CIGRE B2: OVERHEAD LINES

Session Chair: Konstantin Papailiou

CIGRÉ-026
Optimal selection of insulation for NordLink ±525 kV DC transmission line in Norway
B. THORSTEINSSON[1], K. HALSAN[1], I. GUTMAN[2], C. AHLHOLM[2]
[1] Statnett (Norway), [2] STRI (Sweden)

CIGRÉ-051
Experience in UHV test of insulator set and fittings for a 800 kV DC transmission line
J. A. CARDOSO[1], A. NEVES[1] and O. B. OLIVEIRA FILHO[2]
[1] Electrical Energy Research Center – Cepel (Brazil), [2] Consultant

CIGRÉ-061
Calibration of Satellite Resources for Applications of EHV and UHV Polymer Insulation
W.A. CHISHOLM[1], Z. LI[1] and A. MOGILEVSKY[2]
[1] Kinectrics (Canada), [2] CEATI (Canada)

CIGRÉ-105
Experimental and Simulation Study of Partial Arc Activities on Post Insulators with Booster Sheds under Heavy Icing Conditions
S. M. Ale-Emran[1], M. Farzaneh[1], and G. B. Gharehpetian[2]
[1] Canada Research Chair on Atmospheric Icing Engineering of Power Networks (INGIVRE) at Université du Québec à Chicoutimi (Canada), [2] Amirkabir University of Technology (Iran)

SESSION 1B CIGRE A2: TRANSFORMERS

Session Chair: Claude Rajotte

CIGRÉ-047
Tank Rupture Resistance
Ewald Taschler
Siemens AG Österreich Transformers Weiz (Austria)

CIGRÉ-050
Concept Design and Characteristics of 500 kV HVDC Transformer
S.W. Lee, J.Y. Park, S.H. Lee, M.G. Kim, K.H. Park, J. Choi, S.W. Park, Y.G. Kim
LSIS (Republic of Korea)

CIGRÉ-078
Development of dry-insulated 800 kV transformer bushings
LARS JONSSON, ROGER HEDLUND
ABB (Sweden)

CIGRÉ-091
Transient Recovery Voltage at Transformer Limited Fault Clearing
H. Kagawa[1], A. Janssen[2], D. Dufournet[3], H. Kajino[4], H. Ito[4]
[1] Tokyo Electric power Company (Japan), [2] Liander N.V. (The Netherlands), [3] Consultant (France), [4] Mitsubishi Electric Corp (Japan)

SESSION 2A CIGRE B2: OVERHEAD LINES

Session Chair: Masoud Farzaneh

CIGRÉ-017
Methodology for HVDC Corona tests
J.K. Chan[1], J. Kuffel[2], G.C. Sibilant[1], J. Bell[1]
[1] EPRI (USA), [2] Consultant (Canada)

CIGRÉ-055
Effect of electrostatic induction and space charges on the audible corona noise of hybrid AC/DC transmission lines
S. Hedtke, M. Pfeiffer, A. Gaillard, C.M. Franck
Swiss Federal Institute of Technology (ETH Zurich) (Switzerland)

CIGRÉ-077
A New Computational Method for Study of Corona Generated Electric Field Environment of HVDC Transmission Lines
M. Raja Nayak, Pradeep M Nirgude, K.A. Aravind
Central Power Research Institute (India)

CIGRÉ-109
Laboratory Investigation on the Effect of Wind on Corona of HVDC Lines
F. H. YIN[1,2], M. Farzaneh[1], X. L. Jiang[2]
[1] Canada Research Chair on Atmospheric Icing Engineering of Power Networks (INGIVRE), Université du Québec à Chicoutimi (Canada), [2] State Key Laboratory of Power Transmission Equipment & System Security and New Technology, College of Electrical Engineering, Chongqing University (China)

SESSION 2B CIGRE A2: TRANSFORMERS

Session Chair: Brendan Diggin

CIGRÉ-024
Case study : effectiveness of Transformer firefighting (deluge) System in Oman Electricity Transmission Company (OETC) network
IBRAHIM AL BALUSHI
OMAN ELECTRICITY TRANSMISSION COMPANY (Sultanate of Oman)

CIGRÉ-025
DC transformer bushing replacement program in MH HVDC converter stations – implementation of RIP silicone rubber bushing design
R. BRAY[1], B. SCHLITTLER[2], C. KRAUSE[2], D. JAHNEL[3], W. ZIOMEK[4]
[1] Manitoba Hydro (Canada), [2] Weidmann ET AG (Switzerland), [3] HSP (Germany), [4] PTI Manitoba Inc. (Canada)

CIGRÉ-032
Switching phenomena and requirements of the capacitor bank circuit at the tertiary side of 1000kV transformer
S.Tsukao[1], N. Kato[2], S. Nishiwaki[2], M. Toyoda[2], K. Yanagi[2], A. Shiino[2], M. Kosakada[2]
[1] TOKYO Electric Power Co. (Japan), [2] TOSHIBA Corp. (Japan)

CIGRÉ-046
DC Bias in the Power Grid and Possibilities of Compensation
Franz KLAMMLER[1], Gerald LEBER[1], Peter HAMBERGER[2], Florian BACHINGER[2]
[1] SIEMENS AG Austria, Transformers Weiz (Austria), [2] SIEMENS AG Austria, Transformers Linz (Austria)

SESSION 3A CIGRE B2: TRANSMISSION LINE DESIGN

Session Chair: Rob Stephen

CIGRÉ-019
Conception d'une fondation mort terrain évoluée pour pylônes rigides fortement sollicités en territoire éloigné
S. PRUD'HOMME, L.-P. BÉRUBÉ, N. LEMIEUX et J.-F. GRAVEL
Hydro-Québec Équipement (Canada)

CIGRÉ-038
Practical Methods for Estimating Snow Accretion of Overhead Power Lines and Its Impact on Tower Members
Soichiro SUGIMOTO, Tomomi ISHIKAWA, Hisato MATSUMIYA, and Takashi NISHIHARA
Central Research Institute of Electric Power Industry (Japan)

CIGRÉ-068
Review of advanced modelling methods for lattice steel towers
S. LANGLOIS[1], S. PRUD'HOMME[2], F. LÉGERON[1], F. POURSHARGH[1]
[1] Université de Sherbrooke (Canada), [2] Hydro-Québec (Canada)

CIGRÉ-115
BOLD™ Development – Mechanical Considerations for the Design of a Compact EHV Transmission Line
Meihuan Zhu Fulk, Eddie Hannah, Joe Hall, Bruce Freimark, Dave Parrish
American Electric Power (USA)

CIGRÉ-122
Dynamic Behaviour of Transmission Lines Structures under Synoptic Wind Loads
H. Aboshosha[1], A. M. Ibrahim[2], A. A. El Damatty[2], A. Hamada[2]
[1] Boundary Layer Wind Tunnel, Western University (Canada), [2] Department of Civil and Environmental Engineering, Western University (Canada)

CIGRÉ-140
Prospects for Compaction of HVDC Transmission Lines
M. SALIMI[1], I. BARTHOLD[2], D. WOODFORD[3], A. GOLE[1]
[1]Univ. of Manitoba (Canada), [2] Imod (USA), [3] Electranix (Canada)

SESSION 3B CIGRE B3: SUBSTATIONS

Session Chair: Eiichi Zaima

CIGRÉ-008
400 kV GIS Development for Ireland
ROBERT LE ROUX, EVAN BOYLE
ESB International (Ireland)

CIGRÉ-037
Consideration and Implementation of EHV substation in Metropolitan Area
A. RAJAKROM
Metropolitan Electricity Authority (Thailand)

CIGRÉ-049
A Guide for Electrical Asset Replacement Strategy in Substations
Robyn Pascal[1], Alex Bakulev[2], Robert Otal[2]
[1] CEATI International (Canada), [2] METSCO Energy Solutions

CIGRÉ-054
Design considerations for modern 400 kV AC substation in coastal area: what is missing in IEC/CIGRE requirements
M. RADOSAVLJEVIC[1], T. LINDQUIST[1], I. GUTMAN[2], A. DERNFALK[2]
[1] Svenska kraftnät (Sweden), [2] STRI (Sweden)

CIGRÉ-058
Reliable and Cost Effective Solutions for HVDC Switchyards
K. KUTLEV[1], M. MAGNUSSON[2], U. ANDERSSON[1]
[1] ABB (USA), [2] ABB (Sweden)

CIGRÉ-096
Impact of High Short-Circuit Current on Air Insulated Station Strain-Bus Design
JAYDEEPKUMAR TAILOR, BHARAT BHATT
SNC Lavalin Inc. (Canada)

SESSION 4A CIGRE B2: TRANSMISSION LINE DESIGN

Session Chair: Pierre Van Dyke

CIGRÉ-009
Use of HTLS in new line designs
D.A. DOUGLASS[1], R.G. STEPHEN[2], G.C. SIBILANT[3]
[1] DPC, LLC (USA), [2] ESKOM (South Africa), [3] EPRI (USA)

CIGRÉ-021
New trend on Transmission Power Lines and related Stringing Equipment Development
Alberto Oscar
Tesmec S.p.A. (Italy)

CIGRÉ-027
Introduction to ACSR conductor sag at high temperature
G.C. SIBILANT [1], I.E. DAVIDSON[2], R.G. STEPHEN[3], D.A. DOUGLASS[4]
[1] EPRI (USA), [2] UKZN (South Africa), [3] ESKOM (South Africa), [4] DPC, LLC (USA)

CIGRÉ-048
Optimum Design Return Period of EHV Lines Considering Reliability, Security and Availability
Asim Haldar[1], Leon Kempner[2], Alex Mogilevsky[1]
[1] CEATI International (Canada), [2] Bonneville Power Administration (USA)

CIGRÉ-125
Critical Load Cases Simulating Downbursts: Economical Implications for Design of Transmission Lines
Amal Elawady, Ashraf El Damatty, Ayman El Ansary
Department of Civil and Environmental Engineering, The University of Western, Ontario (Canada)

CIGRÉ-129
Load Cases Simulating Tornadoes – Economic Implications for Transmission Line Structures Design
M. HAMADA, A.A. EL DAMATTY
Department of Civil and Environmental Engineering, Western University (Canada)

SESSION 4B CIGRE A3: HIGH VOLTAGE EQUIPMENT

Session Chair: Hiroki Ito

CIGRÉ-015
Canadian experience with dry type EHV current transformers
BINZHAN CHEN[1], ROBERT MIDDLETON[2], JAMES NICHOLSON[3]
[1] BC Hydro (Canada), [2] RHM International (USA), [3] Manitoba Hydro (Canada)

CIGRÉ-033
Development of a Pre-Insertion Resistor for an 800 kV EHV GIS Circuit-Breaker
ZHANG WeiDong, XU Xia
ABB Limited (China)

CIGRÉ-040
Design implementation and testing experience of 1000kV series capacitor in China
CHAOBO Dai[1], ZUTAO Xiang[2], YUHONG Wang[3], PEIPENG Zhou[2]
[1] State Grid Smart Grid Research Institute (China), [2] China Electric Power Research Institute (China), [3] China EPRI Science & Technology Co. LTD (China)

CIGRÉ-056
A Study on Development of Ultra High Voltage Off-Circuit Tap Changer
Y. H. BOTEV[1], Y. H. KIM[2]
[1] Hyundai Heavy Industries Co. (Bulgaria), [2] Hyundai Heavy Industries Co. (Korea)

CIGRÉ-104
Sensor-based non-intrusive condition monitoring technologies for GIS/GCB
Daisuke Yoshida, Takashi Ito, Yoshiyuki Tamura, Daigo Matsumoto, Haruhiko Koyama
Mitsubishi Electric Corporation (Japan)

CIGRÉ-132
A procedure for determining transmission line transposition requirements
J. SCHWARTZ
AltaLink Management Ltd. (Canada)

SESSION 5A CIGRE C4: SYSTEM TECHNICAL PERFORMANCE

Session Chair: Mohamed Rashwan

CIGRÉ-063
Methods for Improving Transient Ground Impedance of Transmission Structures
E. PETRACHE[1], W.A. CHISHOLM[1], A. MOGILEVSKY[2]
[1] Kinectrics Inc. (Canada), [2] CEATI International Inc. (Canada)

CIGRÉ-100
Wide-area control of New York State Power Grid with Multi-Functional Multi-Band Power System Stabilizers
D. RIMOROV[1], A. HENICHE[1], I. KAMWA[1], G. STEFOPOULOS[2], S. BABAEI[2], B. FARDANESH[2]
[1] Hydro- Québec Research Institute (Canada), [2] New York Power Authority (USA)

CIGRÉ-112
Frequency Stabilizer in Transmission Systems
E. SPAHIC, S. LETZGUS, G. BECK, G. KUHN, V. HILD
Siemens AG, Transmission Solutions (Germany)

CIGRÉ-118
Recent activities of insulation coordination for UHV transmission systems in CIGRE C4 and IEC TC 28
Eiichi ZAIMA[1], Eung-Bo SHIM[2], Hideki MOTOYAMA[1]
[1] CRIEPI (Japan), [2] KEPCO (Korea)

CIGRÉ-119
Aspects of insulation coordination for DC links using hybrid lines
C. NEUMANN[1], A. WASSERRAB[1], G. BALZER[1], B. RUSEK[2], S. STEEVENS[2], K. KLEINEKORTE[2]
[1] Darmstadt University of Technology (Germany), [2] Amprion, Dortmund (Germany)

SESSION 5B CIGRE A2: TRANSFORMERS AND CIGRE B1: INSULATED CABLES

Session Chair: Pierre Argaut

CIGRÉ-045
Study of possible regulation range of a 735kV – 110MVAr single phase shunt reactor with on-load tap-changers
C. KOCZULA[1], F. TRAUTMANN[1], L. KIRCHNER[2]
[1] Siemens AG, Large Power Transformers (Germany), [2] Maschinenfabrik Reinhausen GmbH (Germany)

CIGRÉ-075
Life extension technique for extra high voltage power cables
H C Sharma, D R Dharmadhikari, Kapil Kumar
Tata Power Delhi Distribution Limited (TPDDL) (India)

CIGRÉ-079
Insulated Cables for Energy Transmission at UHVAC Level
P.ARGAUT
Cigré Study Committee B1 (Insulated Cables) (France)

CIGRÉ-101
High Power AC and DC Underground Transmission Lines
H. KOCH, D. IMAMOVIC
Siemens AG (Germany)

SESSION 6A OPERATIONAL EXPERIENCE - INSTALLATION AND COMMISSIONING

Session Chair: André Mercier

CIGRÉ-018
Commissioning Test Experience and Related Simulation Analysis of UHV Series Capacitor
Zutao Xiang, Liangeng Ban, Peipeng Zhou, Yuanyuan Zhang, Bin Zheng, Yanan Han, Qiyan Ma
China Electric Power Research Institute (China)

CIGRÉ-069
Risk in Design, Construction and Testing of Grounding System
B. Jamali[1], B. Ma[1], A. Mogilevsky[2]
[1] METSCO Energy Solutions Inc. (Canada), [2] CEATI International Inc. (Canada)

CIGRÉ-108
Present and future of Controlled Switching Commissioning
A. Mercier[1], Y.Filion[1], E. Portales[1], H. Ito[2], H. Koyama[2], T. Mori[2], M. Stanek[3], G. Andrae[3], W. Albitar[3], P. Taillefer[4], J. Amon Filho[5], G. Blanchet[6], T. M. Ohnstad[6], H.G. Richter[7]
[1] Hydro-Québec (Canada), [2] Mitsubishi Electric (Japan), [3] ABB (Switzerland and Germany), [4] Vizimax (Canada), [5] Consultant (Brazil), [6] Statnett (Norway), [7] Siemens (Germany)

CIGRÉ-130
Commissioning of the France Spain HVDC VSC control system replicas
H. SAAD, S. DENNETIERE, C. LALLEMAND, B. CLERC, Y. VERNAY
RTE (France)

SESSION 6B OPERATIONAL EXPERIENCE

Session Chair: Jean-François Allan

CIGRÉ-010
Recent situation of UHV AC transmission systems and TC122 (Ultra high voltage AC transmission systems) Activity
L. YAO[1], B. LI[1], E. ZAIMA[2], K. UEHARA[3], Y. SHIRASAKA[4], B.N.De. BHOWMICK[5]
[1] CEPRI (China), [2] CRIEPI, [3] Toshiba (Japan), [4] Hitachi, [5] PGCIL (India)

CIGRÉ-059
HVDC Black start – Feature and its application
J Danielsson[1], P Hjalmarsson[2], J Karlsson[2]
[1] ABB Inc (USA), [2] ABB AB (Sweden)

CIGRÉ-114
Controlled Switching for Circuit Breakers with Pre-insertion Resistors Energizing Shunt Capacitor Banks
Zach Smith[1], Luke Collette[1], Takashi Yonezawa[1], Tomohito Mori[2], Haruhiko Koyama[2]
[1] Mitsubishi Electric Power Products, Inc. (USA), [2] Mitsubishi Electric Corporation (Japan)

CIGRÉ-135
Test and onsite experience with System Recovery Ancillary Service functions implemented in a VSC-HVDC converter
T. WESTERWELLER, H. BOUATTOUR, E. STARSCHICH, M. DOMMASCHK, J.W. STRAUSS, M. VOR DEM BERGE
Siemens AG (Germany)

SESSION 7A TESTING OF UHV EQUIPMENT

Session Chair: Josef Kindersberger

CIGRÉ-028
Testing of 400 kV GIS
ROBERT LE ROUX, DERMOT DORGAN, BRIAN PERRY
ESB International (Ireland)

CIGRÉ-053
Challenges to perform standardized dielectric tests of UHV arrangements
L. AREVALO, D. WU, R. MONTANO
ABB HVDC (Sweden)

CIGRÉ-057
HV and EHV bushing condition assessment – field experience
ISMAIL GÜNER[1], DIEGO M. ROBALINO[2], PETER WERELIUS[3]
[1] Hydro-Québec (Canada), [2] Megger (USA), [3] Megger (Sweden)

CIGRÉ-066
Dielectric Testing of Ultra High Voltage Equipment
UWE RIECHERT[1], RALF PIETSCH[2]
[1] ABB Switzerland Ltd (Switzerland), [2] HIGHVOLT Prüftechnik Dresden GmbH (Germany)

CIGRÉ-071
Experience with On-Line Insulation Diagnostics of Surge Arresters By Partial Discharges Measurement in the Field
T.B. RODRIGUES, H.P. AMORIM JÚNIOR, A.T. CARVALHO, C.F.C. CARVALHO, J.B.S. BORGES
CEPEL – Electric Energy Research Center (Brazil)

CIGRÉ-080
Making Test of a Fast Acting Earthing Switch for an EHV GIS
Eric-Qingjun Liu
ABB Ltd. (China)

SESSION 7B DESIGN OF UHV EQUIPMENT

Session Chair: Uwe Riechert

CIGRÉ-011
The development of large potential shields for UHV DC application
D. WU[1], L. ARÉVALO[1], R. MONTANO[1], M. LI[2], M. LARSSON[2]
[1] ABB HVDC (Sweden), [2] ABB Corporate Research

CIGRÉ-016
Cascade Style Composite Insulation Dry Type Current Transformer for EHV Applications
RUZHANG WANG[1], ZHAOHUI LIU[2], CHUNYAO CAO[2], HUAN WANG[2], ERIC EUVRARD[2], BOB MIDDLETON[2]
[1] Electrical Power Research Institute of China (China), [2] RHM International (USA)

CIGRÉ-106
Development of mixed gas GCB applied to low-temperature environment
Yuji Yoshitomo, Daisuke Fujita, Daisuke Yoshida
Mitsubishi Electric Corporation (Japan)

CIGRÉ-111
Seismic Solutions and Testing for High Voltage Air Insulated Switchgear
FRANCESCO PICCOLI, RIYAD KECHROUD, HADI ALIDOU, DANIELLE TREMBLAY, MATTHEW L. SMITH, GEORGES DOUMMAR
GE Energy Connections Grid Solutions (USA, Italy, France, Canada)

CIGRÉ-117
Measuring Solution for (U)HV DC and AC
J. SCHÄFER, L. HUEGELSCHÄFER, M. BECK
Siemens AG (Germany)

CIGRÉ-136
420kV AIS circuit-breaker performance comparison for shunt reactor application
Guilhem Blanchet[1], Trond Magne Ohnstad[1], Dag Petter Lysheim[1], Magne Runde[2]
[1] Statnett (Norway), [2] SINTEF Energy Research (Norway)

TECHNICAL VISIT

Hydro-Québec's research institute, IREQ, is one of North America's largest integrated electrical research and testing centres. Created in 1967, IREQ has developed large-scale expertise in electrical equipment, network analysis and control, automation and measurement, materials, chemical and mechanical engineering, and applications of electricity. Its impressive facilities include an experimental line for mechanical tests, a high-voltage laboratory, a mechanical-thermomechanical laboratory, a power system study and simulation centre and an electro-technology laboratory. IREQ also boasts various specialized laboratories, notably in robotics, battery materials and mechanical engineering. Its main facilities are located Varennes, about 45 minutes from downtown Montréal.

A technical visit of IREQ will be organized on the morning of Wednesday, May 11. Shuttle bus from the hotel at 8h45, and return by bus around 13h00 (schedule is subject to change). Limited to 50 participants. See the registration details at www.cigre-hv.ca/2016/en/technical-visit/.