SC B4
DC SYSTEMS AND POWER ELECTRONICS

CIGRE
Comitato Nazionale Italiano

Riunione del 29 Novembre 2018
c/o Auditorium TERNA - Roma

Sintesi delle attività
Presidente: Mohamed Rashwan (Canada)
Segretario: Jingxuan (Joanne) Hu (Canada)

Membro italiano: Stefano Malgarotti da agosto 2016

4 ADVISORY GROUPS

- AG 01: Strategic Advisory Group
- AG02 DC Grid Coordination
- AG03 Communication and website
- AG04: HVDC system and FACTS Device Performance

15 Working Groups attivi, di cui 3 joint
### WGs attivi del B4

<table>
<thead>
<tr>
<th>NAME</th>
<th>GIVEN NAME</th>
<th>STATUS</th>
<th>WG</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Koreman</td>
<td>Kees (C.G.A.)</td>
<td>convener</td>
<td>JWG B4/B5.59</td>
<td>Control and Protection of HVDC Grids</td>
</tr>
<tr>
<td>Beerten</td>
<td>Jef</td>
<td>convener</td>
<td>B4.64</td>
<td>Impact on AC System Characteristics on the Performance of HVDC schemes</td>
</tr>
<tr>
<td>Parisot</td>
<td>Alexandre</td>
<td>convener</td>
<td>JWG B4/C1.65</td>
<td>Recommended voltages for HVDC grids</td>
</tr>
<tr>
<td>Cattan Jusan</td>
<td>Fernando</td>
<td>convener</td>
<td>B4.66</td>
<td>Implications for harmonics and filtering of the staggered installation of HVDC converter stations in proximate locations</td>
</tr>
<tr>
<td>Shore</td>
<td>Nigel</td>
<td>convener</td>
<td>B4.67</td>
<td>Harmonic aspects of VSC HVDC, and appropriate harmonic limits</td>
</tr>
<tr>
<td>Shore</td>
<td>Nigel</td>
<td>convener</td>
<td>B4.68</td>
<td>Revision of Technical Brochure 92 – DC Harmonics and Filtering</td>
</tr>
<tr>
<td>Woodford</td>
<td>Dennis</td>
<td>convener</td>
<td>B4.69</td>
<td>Minimizing loss of transmitted power by VSC during overhead line fault</td>
</tr>
<tr>
<td>Demetriëre</td>
<td>Sébastien</td>
<td>convener</td>
<td>B4.70</td>
<td>Guide for Electromagnetic Transient Studies involving VSC converters</td>
</tr>
<tr>
<td>Mohaddes</td>
<td>Mojtoba</td>
<td>convener</td>
<td>B4.71</td>
<td>Application guide for the Insulation coordination of Voltage Source Converter (VSC-HVDC) stations</td>
</tr>
<tr>
<td>An</td>
<td>Ting</td>
<td>convener</td>
<td>B4.72</td>
<td>DC grid benchmark models for system studies</td>
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<tr>
<td>Saltzer</td>
<td>Markus</td>
<td>convener</td>
<td>JWG B4/B5/C3.73</td>
<td>Surge and extended overvoltage testing of HVDC Cable Systems</td>
</tr>
<tr>
<td>Guo</td>
<td>Qi</td>
<td>convener</td>
<td>B4.74</td>
<td>Guide to Develop Real-Time Simulation Models (RTSM) for HVDC Operational Studies</td>
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<tr>
<td>Rathke</td>
<td>Christian</td>
<td>convener</td>
<td>B4.75</td>
<td>Feasibility Study for assessment of lab losses measurement of VSC valves</td>
</tr>
<tr>
<td>Jovicic</td>
<td>Dragan</td>
<td>convener</td>
<td>B4.76</td>
<td>DC-DC converters in HVDC Grids and for connections to HVDC systems</td>
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<tr>
<td>Walker</td>
<td>Kerry</td>
<td>convener</td>
<td>B4.78</td>
<td>Cyber Asset Management for HVDC/FACTS Systems</td>
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### Partecipazione Italiana ai WGs attivi del B4

<table>
<thead>
<tr>
<th>NAME</th>
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<tbody>
<tr>
<td>Pitto</td>
<td>Andrea</td>
<td>Member</td>
<td>JWG B4/B5.59</td>
<td>Control and Protection of HVDC Grids</td>
<td><a href="mailto:andrea.pitto@rse-web.it">andrea.pitto@rse-web.it</a></td>
</tr>
<tr>
<td>Sommantico</td>
<td>Gabriele</td>
<td>Member</td>
<td>JWG B4/C1.65</td>
<td>Recommended voltages for HVDC grids</td>
<td><a href="mailto:gabriele.sommantico@terna.it">gabriele.sommantico@terna.it</a></td>
</tr>
<tr>
<td>Valade</td>
<td>Ivan</td>
<td>Member</td>
<td>JWG C4/B4.38</td>
<td>Network Modelling for Harmonic Studies</td>
<td><a href="mailto:ivan.valade@cesi.it">ivan.valade@cesi.it</a></td>
</tr>
<tr>
<td>Agustoni</td>
<td>Alessandro</td>
<td>Corresp. member</td>
<td>B4.70</td>
<td>Guide for Electromagnetic Transient Studies involving VSC converters</td>
<td><a href="mailto:alessandro.agustoni@cesi.it">alessandro.agustoni@cesi.it</a></td>
</tr>
<tr>
<td>Mattia</td>
<td>Pizzienna</td>
<td>Member</td>
<td>B4.71</td>
<td>Application guide for the insulation coordination of Voltage Source Converter HVDC (VSC HVDC) stations</td>
<td><a href="mailto:mattia.pizzienna@terna.it">mattia.pizzienna@terna.it</a></td>
</tr>
<tr>
<td>Colla</td>
<td>Luigi</td>
<td>Member</td>
<td>JWG B4/B1/C4.73</td>
<td>Surge and extended overvoltage testing of HVDC Cable Systems</td>
<td><a href="mailto:luigi.colla@prysmiangroup.com">luigi.colla@prysmiangroup.com</a></td>
</tr>
<tr>
<td>Crippa</td>
<td>Alessandro</td>
<td>Member</td>
<td>C2/B4.38</td>
<td>Capabilities and requirements definition for Power Electronics based technology for secure and efficient system operation and control</td>
<td><a href="mailto:alessandro.crippa@cesi.it">alessandro.crippa@cesi.it</a></td>
</tr>
<tr>
<td>Parma</td>
<td>Ferdinando</td>
<td>Member</td>
<td>B4.74</td>
<td>Guide to Develop Real-Time Simulation Models (RTSM) for HVDC Operational Studies</td>
<td><a href="mailto:Ferdinando.parma@cesi.it">Ferdinando.parma@cesi.it</a></td>
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<tr>
<td>Danelli</td>
<td>Aldo</td>
<td>Member</td>
<td>B4.79</td>
<td>Hybrid LCC/VSC HVDC Systems</td>
<td><a href="mailto:aldo.danelli@cesi.it">aldo.danelli@cesi.it</a></td>
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### Partecipazione Italiana a nuovi WGs del B4

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</table>
Standardization bodies (IEC)

- IEC 20 / WG 016 High Voltage Cables - MEREGALLI SERGIO
- IEC - PT 62895 High Voltage Direct Current (HVDC) power transmission cables with extruded insulation and their accessories for rated voltages up to 320 kV for land applications - Test methods and requirements, TC20, 2014 – UBERTO VERCELLOTTI

ANTONIO ARDITO (IEC AND CENELEC OFFICER)
- IEC 77A/WG01 harmonics and other low-frequency disturbances,
- IEC 77A/WG02 voltage fluctuations,
- IEC 77A/WG08 description of the emc environment
- IEC 77A/WG09 power quality measurement methods

- CEI Italian Electrical Committee, CT115/122 "HVDC (above 100 kV) and UHV AC (above 800 kV) Transmission Systems“ (mirror of IEC/CENELEC): Chairman: ANTONIO ARDITO, Secretary: STEFANO MALGAROTTI
- IEC / TC 115 WG 5 System design of HVDC project - MURGIA PIERO
- CEI Italian Electrical Committee, CT22 "Power Electronics” (mirror of IEC/CENELEC): Chairman: Antonio Ardito – Secretary: MIGUEL FICARRA
Reference: 675

Type: TECHNICAL BROCHURES
Title: General guidelines for HVDC electrode design

Reference: 683

Type: TECHNICAL BROCHURES
Title: Technical requirements and specifications of state-of-the-art HVDC switching equipment

Reference: 684

Type: TECHNICAL BROCHURES
Title: Recommended voltages for HVDC grids
Pubblicazioni 2017-2018 (Tech. Brochures) 2/3

Reference: 697

Type: TECHNICAL BROCHURES
Title: Testing and commissioning of VSC HVDC systems

Reference: 699

Type: TECHNICAL BROCHURES
Title: Control methodologies for direct voltage and power flow in a meshed HVDC grid

Reference: 713

Type: TECHNICAL BROCHURES
Title: Designing HVDC grids for optimal reliability and availability performance
Reference: 717

Type: TECHNICAL BROCHURES
Title: Protocol for reporting operational performance of FACTS

Reference: 739

Type: TECHNICAL BROCHURES
Title: Protection and local control of HVDC-grids
Pubblicazioni 2017 (Electra)

Electra
Control methodologies for direct voltage and power...
Ref.: ELT_294_5
2017

Electra
Commissioning of VSC HVDC systems
Ref.: ELT_294_3
2017

Electra
Recommended voltages for HVDC grids
Ref.: ELT_292_2
2017

Electra
Technical requirements and specifications of...
Ref.: ELT_292_1
2017

Electra
General guidelines for HVDC electrode design
Ref.: ELT_290_7
2017

Electra
Connection of wind farms to weak AC networks
Ref.: ELT_290_3
2017
Pubblicazioni 2018 (Electra)

Electra Protection and local control of HVDC-grids
Ref.: ELT_300_4
2018

Electra Protocol for reporting operational performance...
Ref.: ELT_297_2
2018

Electra Designing HVDC grids for optimal reliability and...
Ref.: ELT_296_6
2018
Pubblicazioni 2017 (Colloquia Paper)

Reference: COLL_WIN_2017

Type: COLLOQUIA

Title: Colloquium - Winnipeg 2017 - A3, B4 & D1

Green Book (pubblicazione futura 2019/20)

SC B4 Green Book on FACTS
Risultati tecnici principali della Session 2018

La sessione ha visto la presenza di oltre 250 delegati. Sono stati presentati 45 papers. La discussione ha visto 67 “prepared contributions” and 27 “spontaneous contributions”. Come sempre l’elevato numero di paper (e relative “contributions”) riflette il grande interesse per l’HVDC e più in generale per la Power Electronics.

Preferential Subject 1: “HVDC systems and their applications” con i seguenti argomenti di discussione:
- Planning and implementation of new HVDC projects (including, need, justification, design, integration of wind generation, environmental and economic assessment)
- Application of new technologies in HVDC, HVDC Grids / Multi-Terminal HVDC
- Refurbishment and upgrade of existing HVDC systems
- Service and operating experience
Risultati tecnici principali della Session 2018

Preferential Subject 2: “DC and other Power Electronic (PE) systems for distribution systems” con i seguenti argomenti di discussione:
- PS2-1: Medium voltage HVDC and its applications in distribution systems
- PS2-2: Planning and implementation of new distribution projects
- PS2-3: New concepts, designs

Preferential Subject 3: “FACTS and other Power Electronic (PE) systems for transmission systems” con i seguenti argomenti di discussione:
- Planning and implementation of new projects (including, need, justification, FACTS devices for Renewables, environmental and economic assessment)
- Application of new technologies in FACTS and other PE equipment
- Refurbishment and upgrade of existing FACTS and other PE systems
- Service and operating experience
Next Meetings 2019


- June 4 - 7, 2019 - Alborg (Denmark) - Symposium C4/B1/B4/C1/C2

- September 28 – October 3, 2019 - CIGRE B4 International Colloquium – Johannesburg (South Africa)
Preferential Subjects 2020

Special reporters: Ting An and Les Brand

**PS 1: HVDC systems and their applications**
- Planning and implementation of new HVDC projects including need, justification, design, integration of renewables, environmental and economic assessment
- Application of new technologies in HVDC, HVDC Grids / Multi-Terminal HVDC, and hybrid dc systems
- Refurbishment and upgrade of existing HVDC systems
- Service and operating experience of converter stations including off shore platforms.

**PS 2: DC and Power Electronic (PE) for distribution systems**
- DC deployed in distribution systems
- PE and FACTS devices applied in distribution projects including the economics and reliability
- New concepts and designs
- Power electronics interfacing generation and storage to the network

**PS 3: FACTS**
- Planning and implementation of new projects including, need, justification, FACTS devices for renewables, environmental and economic assessment
- Application of new technologies in FACTS and other PE equipment
- Refurbishment and upgrade of existing FACTS and other PE systems
- Service and operating experience