Cigré Study Committee SC B3 “Substations”

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SC B3 Profile

- **Fields of Activity:**
  Design, construction, maintenance and ongoing management of substations and electrical installations in power stations, excluding generators

- **Working bodies:**
  - 16 working groups
  - 3 advisory groups
SC B3 Organization

Concepts and Developments
- SC B3.12 Obtaining Value from Substation Condition Monitoring
- SC B3.13 Reducing Replacement Time of HV Equipment
- SC B3/C1/C2.14 Circuit Configuration Optimisation
- SC B3.26 Guidelines for the Design and Construction of AC Offshore Windfarms

Gas Insulated Substations
- SC B3/B1.27 Economical Aspects of GIL and Underground Cables
- SC B3.17 Residual Life Concepts Applied to HV GIS
- SC B3.25 SF6 Analysis for AIS, GIS, MTS Condition Assessment
- SC B3.30 Guide to minimize SF6 during testing of electrical equipment
- SC B1B13.33 Common dry type interfaces for GIS connections above 52 kV for extruded cables
- SC B3.29 Field tests technology on UHV substation construction and operation

Air Insulated Substations
- SC B3.23 Guidelines for Uprating and Upgrading of Substations
- SC B3.31 Air insulated substations design for severe climatic conditions
- SC B3.32 Saving through optimized maintenance of air insulated substations

Substation Management
- SC B3.06 Substation Management
- SC B3.10 Primary/Secondary System Interface Modelling for Total Asset Performance
- SC B3.34 Expected impact of the future grid concept on substation management

Membership:
- 25 regular members of the SC
- 12 observer members of the SC
- > 260 active working group members
SC B3 Profile

Mission:

– To facilitate and promote the progress of substation engineering and the international exchange of information and knowledge in the substations field
– To add value to this information and knowledge by means of synthesizing state-of-the-art practices and developing recommendations.

Objectives:

– Increased plant reliability and availability
– Optimized management of assets
– Reduction of the environmental impact
– Recognition of social needs and priorities in facilitating sustainable development
– Adoption of appropriate technological advances in equipment and systems to achieve these objectives
SC B3 Main Technical Directions

- **T1. New substation concepts:**
  - Development of new concepts including bus arrangements
  - Hybrid solutions
  - New applications and functions including specification of corresponding design and layout criteria for substations constituting integral parts of totally optimized networks

- **T2. Substation management issues:**
  - Organizational aspects including human resource and training needs
  - In-service support
  - Software management including quality control and maintenance
  - Asset management including technical, financial and regulatory requirements.
SC B3 Main Technical Directions

**T3. Life cycle management and maintenance:**
- Monitoring in-service experience including digital and sophisticated measuring equipment
- Substation condition assessment including SF$_6$ monitoring and SF$_6$ handling
- Aspects of maintenance outsourcing taking into account short- and long-term needs as well as handling of spare parts
- Opportunities for cost reduction
- Increased utilization of substations by life extension, upgrading or uprating
- Refurbishment and renovation concepts
- Investment strategies
- Principles for combining existing and new equipment - taking into account specific demands from network-reliability and customer demand-side points of view.
T4. Impact of new communication standards and Smart Grids on existing and new substations:

- New technologies to be used in substations
- Increased use of advanced information and communication technologies under HV conditions
- Aspects of the implementation of the IEC 61850 communication standard in substations
- Impact of distributed generation and power flow control systems
Activity Areas

The main technical directions are the base of the work for the various working groups. To strengthen the exchange of experience the WGs are clustered in four activity areas:

- Substation concepts and developments
- Gas insulated substations
- Air insulated substations
- Substation management
Activity Areas

➢ Substation Concepts and Developments:

- WG B3.12: Obtaining value from substation condition monitoring
- WG B3.13: Reducing replacement time of high voltage equipment
- WG B3.26: Guidelines for the design and construction of AC offshore wind farms
- JWG B3/C1/C2.14: Circuit configuration optimization
Activity Areas

➢ Gas Insulated Substations:

- WG B3.17: Residual life concepts applied to HV GIS
- WG B3.25: SF\textsubscript{6} analysis for AIS,GIS and MTS condition assessment
- WG B3.29: Field tests technology on UHV substations during construction and operation
- WG B3.30: Guide to minimize SF\textsubscript{6} during testing of electrical equipment
- JWG B3/B1.27: Economical aspects of GIL and underground cables
- JWG B1-B3.33: Common dry type interfaces for GIS connections above 52 kV for extruded cables
Activity Areas

➢ Air Insulated Substations:

• WG B3.23: Guidelines for uprating and upgrading of substations
• WG B3.31: Air insulated substations design for severe climatic conditions
• WG B3.32: Saving through optimized maintenance of air insulated substations
Activity Areas

➢ Substation Management:

• WG B3.06: Substation management
• WG B3.10: Primary/Secondary system interface modeling for total asset performance
• WG B3.34: Expected impact of the future grid concept on substation management
Result of the Work: Technical Brochures


➢ WG B3.18: “SF6 Tightness Guide” (Technical Brochure no 430 published in ELECTRA in October 2010)

➢ WG B3.21: “Turnkey substations” (Technical Brochure no 439 published in ELECTRA in December 2010)

SC B3 Future Main Activities

- Preparation of the next SC B3 Session 2012 in Paris
  August 27-31, 2012
  - SC B3 Poster Session on August 28, 2012
  - SC B3 Meeting on August 29, 2012
  - SC B3 Session on August 30, 2012: Call for papers published

- Update of the Strategic Plan 2005-2014

- Update of the Action Plan 2010-2012
SC B3 Session 2012 in Paris August 27-31, 2012:
Preferential subjects of SC B3:

PS 1: Advances in Substation Technologies

- Challenges on the design of UHV AC substations
- Use of GIS for HVDC busbars and switchgears
- Impact of IEC 61850 and non-conventional instrument transformers on the substation design
- Requirements on the design of offshore AC substations
- Reducing the environmental footprint of substations
SC B3 Session 2012 in Paris August 27-31, 2012: Preferential subjects of SC B3:

PS 2: Substation Management Experience

• Experiences with UHV substations
• Modification of existing substations to meet new requirements such as higher ratings, improved reliability and reduced maintenance
• Monitoring and condition assessment for substations and GIL
• Managing different reliability and life expectancy of primary and secondary equipment
Future Symposia or colloquia:

- SC B3/B2/B5 Symposium in Mumbai/India on January 19-20, 2012 (in preparation): Title and topics are not yet defined

- SC B3/D1 Colloquium in Brisbane/Australia on September 2013 (in preparation): Title and topics are not yet defined
SC B3 Meetings

- SC B3 SAG/CAG/TAG Meeting on November 15-17, 2010, in Tokyo/Japan
- SC B3 IEEE/CIGRE Colloquium, Tutorial and Meeting in Chicago/USA on May 15-19, 2011
- SC B3 SAG/CAG/TAG Meeting on November 7-9, 2011 (venue not yet defined)
- SC B3 Meeting in Paris on August 25, 2012
- SC B3 Meeting in Brisbane/Australia in September 2013 in connection with a symposium or colloquium
SC B3 Cooperation

Cooperation with other international organizations:

IEC

POWER ENGINEERING SOCIETY

IEEE

CIRED
Conclusion

- The challenges in the power grids now and in the future will have an impact on the substations. It is the key role of SC B3 to work on proposals and solutions to cope with these changes and challenges.

- Many activities are running in the SC B3 to handle all the aspects of engineering, construction and operation of existing and future substations.

- Cigré members have a wide range of knowledge and expertise. It is the clear goal to offer it to everybody involved in substation projects and management, in particular to young engineers.

- Joint IEEE/CIGRE meetings and colloquia are an excellent opportunity to exchange experience and expertise. Each participant can benefit from the knowledge available in both organizations.