

CIGRE A3

High Voltage Equipment

September 2013

Mietek Glinkowski – USNC representative to A3

CIGRE A3- High Voltage Equipment

- CIGRE Study Committee A3 covers High Voltage Equipment:
 - Switchgear (HV, MV)
 - Capacitors
 - Surge Arresters
 - Instrument Transformers
- 24 Countries have memberships
- Work based on WG meetings (separate)
- Most recent WG Terms of Reference (TOR) and contacts are available here: <http://cigre-usnc.tamu.edu/workinggroups/>

A3.27

- **A3.27 – The impact of the application of vacuum switchgear at transmission voltages, chair: Rene Smeets, NL, TOR available upon request**
- US members:
 - Kirk Smith, Eaton
 - Mietek Glinkowski, ABB Inc.
 - Pete Meyer, S&C
 - Dave Johnson, consultant
- UGT group participated in the global survey with 22 responses (largest group!)
- Last meeting – Galveston, TX- April, 2013

A3.28

- **Switching phenomena and testing requirements for UHV & EHV equipment**, chair (new): Denis Dufournet (FR) TOR available
- Field experience and switching behavior during and after commission
- Benchmark study of interrupting requirements of GCB based on model UHV/EHV networks
- Benchmark study of switching requirements of DS, HSGS and ES based on model UHV/EHV substations

A3.29

- **DETERIORATION OF AGEING SUBSTATION EQUIPMENT AND POSSIBLE MITIGATION TECHNIQUES**
- Convenor: Ankur MAHESHWARI (AU)
- **Scope:**
 - Material and equipment deterioration/degradation
 - Lifetime (residual life) assessment techniques
 - Life extension:
 - Life management for new equipment
- **TOR** posted on Webpage
- US members: Ken Edwards (BPA), Harvey Wilson (Mitsubishi), Jon Woodworth (Arresterworks)-active?, Arvind Chaudhary – active?,

A3.30

IMPACT OF OVERSTRESSING OF SUBSTATION EQUIPMENT

Convenor: Antonio Carvalho (BR)

- Review key network parameters and anticipated stresses affecting equipment capabilities
- Review of methods already in use to assess the risk of operating beyond the performance limits
- Identification of potential failure modes of overstressed equipment and their impacts (safety, reliability, availability)
- Determination of the capabilities of the equipment involved (Standards, Test Protocols, manufacturer's information, re-testing)
- Mitigation techniques
- Impact of overstressing on residual life (where immediate failure is avoided)
- Usefulness of information supplied at type and endurance testing & proposals for enhancements
- Interaction with age and/or condition information

TOR posted on our Webpage

US member: Ken Edwards (BPA)

Instrument Transformers with digital output

Convenor: Farnoosh Rahmatian, CA

- Proposal & analysis of procedures for calibration of the entire measuring chain, both in the factory and on site, for digital output of NCITs or for a SAMU connected to classical ITs and/or EITs.
- Description of the practical applications of using flexible EITs for on-site calibration without disconnection or de-energisation.
- Consideration and description of the migration of the digitalisation process from low voltage equipments (protective relays, meters, ...) to the high voltage equipments. Overall accuracy of the measurement chain, including transient responses for both protective and measuring classes, and taking into account the work of B5.24, will be proposed for consideration by IEC standardisation committees.
- Investigation & proposals for DC accuracy classes and calibration method for HVDC applications.
- Proposal & analysis of EMC test methods considering various earthing and shielding techniques for specific application of EITs and SAMU up to 1100 kV. A test procedure will be developed & proposed taking into account the requirements of the IEC 60044-8.
- Analysis & discussion of redundancy requirements for EITs and SAMU in the context of protection schemes.
- Proposal and analysis of solutions where control functions using digital signals, e.g. for disconnectors or circuit breakers, are integrated into the NCIT or SAMU hardware.

- US members: None

The group will maintain a close dialogue with the relevant IEC committees via shared membership & mutual reporting.

Non-intrusive methods for condition assessment of distribution and transmission switchgears

Convenor : Nenad Uzelac (United States)

Scope :

1. To review existing state of the art of non-intrusive methods and their field experience applied in HV and MV CB/R/FI to assist in the evaluation of transmission & distribution equipment conditions using the different parameters such as:

- a. Insulation: gas characteristics (decomposition product, pressure, etc.) and partial discharges
- b. Switching: operation time, pole discrepancy, re-strike, dielectric stress assessment, arcing time and contact wear
- c. Current carrying: contact resistance, temperature and position
- d. Mechanical drive: number of operations, energy, vibrations and damping
- e. Control and accessories: supply voltage, coil current, auxiliary switch and heat

2. To provide users experiences, case studies and application feed-back

3. To analyse technical vs economical benefit for applying non-intrusive methods on CB/R/FI

4. To identify future trends in the technology and switchgear user requirements

- Nominated US members: Jack Arnold (National Instruments), Kip Benson (S&C)
- <http://cigre-usnc.tamu.edu/workinggroups/>

Experience with equipment for Series / Shunt Compensation

Convenor: **Guofu Li (China)**

Scope:

A. Investigation of developments and service experience with equipment for new series /shunt compensation.
Investigation of the impacts of system transients on the new equipment / components

Investigation of the impact of the new equipment / components on system transients and HV equipment requirements.

B. Addressing requirements for equipment / components applied to series / shunt compensation, for example

- UHV / EHV bypass switch
- (Fast acting) bypass gap
- UHV / EHV bypass isolating disconnectors
- (Thyristor controlled) capacitor bank
- MO Varistor
- Equipment connected to transformer's tertiary windings.

C. Addressing requirements for HV equipment which is influenced by the new developments in series / shunt compensation: shunt reactors, HSES, circuit-breakers, MOSA

D. Special capacitor-bank applications for tertiary winding connected shunt compensation (which is not covered by WG A3.26)

- Nominated US members: Bharat Bhargava (Electric Power Group)
- <http://cigre-usnc.tamu.edu/workinggroups/>

New Working Groups



JWG A3/B4.34 - Technical Requirements and Specification of DC switchgear

Convenor – C. Franck (CH)

WG A3.35 – Best practices for commissioning of controlled switching

Convenor– A. Mercier

For more information:

<http://cigre-usnc.tamu.edu/workinggroups/>

Future CIGRE activities related to A3

- Meetings of Study Committee A3
 - Fall 2013 – Sept 16-20, Auckland, New Zealand jointly with A2, B2, B3, C6, 3 tutorials and colloquium planned, contact: Ray Brown- NZNC
 - 2015 – proposals from India, Japan, China,
- Tutorials to IEEE Switchgear Committee:
 - Circuit Breaker TRV - Denis Dufournet, M. Aristizabal – Fall 2013

CIGRE General Session 2014

- 4 US paper synopses submitted to A3 under three preferential subjects:
- **PS1 > Equipment to cater for changing network conditions** • AC and DC substation equipment to meet new demands. • Equipment for future distribution systems. • New requirements for design, testing and equipment modeling.
- **PS2 > Lifetime management and ageing of T&D equipment** • Maintenance, monitoring and equipment diagnosis. • Influence of asset management practices, operating duty and Stresses on reliability.
- **PS3 > Impact of extreme operating conditions on T&D equipment** • Environmental stresses e.g. temperature, humidity, earthquake, wind, heavy rain, altitude. • System stresses and over-stressing e.g. short-circuit current, temporary overvoltage, transient recovery voltage, uprating or higher operating voltages. • Operational regime.