

Year 2002
Progress Report of Study Committee A3
High Voltage Equipment

by E. Kynast, Secretary of SC A3

Field of activities

Since the reorganization of CIGRÉ in August 2002 this Committee is named Study Committee A3 "High Voltage Equipment". The scope of the former Study Committee 13 "Switching Equipment" has been carried over and expanded to include all high voltage equipment.

Study Committee A3 is responsible for the theory, design, construction, and application of high voltage equipment components, equipment, and equipment systems for both AC and DC systems.

This equipment includes all devices for switching, interrupting, or limiting currents (circuit breakers, load switches, disconnect switches, earthing switches, fault current limiters, etc.) independent of technology according the scope of the former SC 13.

Due to the expansion to SC A3 it also includes surge arresters, capacitors, busbar and equipment insulators, instrument transformers, bushings, and all other high voltage equipment not specifically covered under another equipment study committee's scopes. Emphasis is on function and interaction of high voltage equipment including air and gas-insulated equipment, solid insulation used in high voltage equipment, outdoor insulation, and equipment using other insulation systems and interrupting media.

The transition from SC 13 into A3 with the wider scope was successfully performed in year 2002. Only about one third of the members origin from SC 13, the others are newly nominated members. It turned out that a broad expertise is available amongst these new members covering all the equipment which is within the responsibility of A3 – which is a good basis for the new Study Committee.

Structure and groups of SC A3

Study Committee A3 is representing 35 countries by regular and observer members.

In order to cope with the diversity of different apparatus SC A3 has to cover, Advisory Groups were installed. Advisory Group A3.01 "Strategic Planning" defines the goals, directions and strategy of the Study Committee in detail, figures out necessary fields of activity and supports establishing of new working groups.

AG A3.02 and AG A3.03 are responsible for coordination of the activities of SC A3 and the relevant IEC Technical Committees respectively IEEE standardization bodies.

Advisory Group A3.04 "Tutorials" will develop, manage and deliver tutorials within the scope of SC A3. This AG will also handle links with universities and the promotion of research topics to the universities. Tutorials can be held in conjunction with CIGRE events: Regional Meetings, National Committee Meetings, Colloquiums and Symposiums. Presenting tutorials at CIRED events may also be considered appropriate.

Concerning the technical work four working groups (WG A3.07, 10, 11 and 12) are focussed on switchgear only in continuation of SC 13.

Two working groups (WG A3.06 and 13) were founded in 2002 (still within the responsibility of SC 13) and are dedicated to reliability and changing network conditions. Their scope has been adapted to the broader task of SC A3, so beside switchgear, other high voltage equipment will be considered.

Four new working groups, covering surge arrestors, non conventional instrument transformers, current limiters and grading capacitors are on their way. Detailed scopes were worked out, Conveners were nominated and the establishing of the groups is running.

Furthermore five Joint Task Forces exist where SC A3 is contributing, but not leading, in continuation of SC13. Participants are A2/B3/C4.

Activities of Working Groups

WG A3.07 : Controlled switching Convener: M. Waldron (United Kingdom)

A summary of the document "Controlled switching of HVAC circuit-breakers – Planning Specification & Testing" was published in Electra No. 197, August 2001.

The working group is now in the latter stages of producing a final document which covers:

- Economic factors associated with the use of controlled switching (common cases)
- Technical & economic aspects of controlled transformer switching
- Survey of controller use to date
- Potential use of controlled switching for load/fault switching and equipment up-rating.

This is expected to be the last publication of the WG and should be substantially complete in 2003.

The WG has also taken the opportunity of going to Australia to participate in a one day controlled switching workshop to facilitate an interchange of views between the WG members and users of controlled switching in Australia.

WG A3.10: Specifications for short current limiters Convener: A. H. Schmitt (Germany)

The up-rating of the load carrying capacity of medium and high voltage distribution systems leads to considerations to use short circuit current limiters. The first report of the Working Group "Functional specifications for short circuit current limiters" has been finished and published. A great variety of techniques are applied at present which are described in 26 applications, most of them industrial. The results of an inquiry among potential users of fault current limiters out of industry as well as utilities are incorporated.

The three parts of work were finished

- Testing
- State of the art
- System demands

The work of WG A3.10 was completed in writing the final version of the parts together and the final work will be published in a Technical Brochure in 2003.

WG A3.11: Application Guide for IEC 62271-100 and IEC 60694 **Convener: H.H. Schramm (Germany)**

To support users and to provide them with background information a guide will be worked out upon the requirements of the Standards IEC 62271-100 "High-voltage alternating-current circuit-breakers" and IEC 60694 (62271-001) "Common specifications for high-voltage switchgear and controlgear standards".

Draft of Part 2 of the Application Guide with a wide range of topics was finished. Some questions are still under discussion as they are:

- Switching of transformers under no-load
- Grading capacitors

It has been decided that the Applications Guide to IEC 62271-001 and 100 will be published as a complete brochure under double logo for CIGRE and IEC. Summaries will be drawn out for publications where it will be suitable.

The two drafted parts are scheduled for publication End 2003.

WG A3.12: Circuit-breaker controls **Convener: H. Wilson (USA)**

The task of WG A3.12 is to investigate the recent developments in circuit-breaker control technology, as change from conventional to electronic control. The integration into substation control in respect on the requirements of circuit-breakers and systems and the future trends in this area will be lined out.

Background of the work for WG A3.12 is that circuit breaker controls have a major impact on the reliability of circuit breakers. In the 2nd International Enquiry on high voltage circuit breaker failures and defects in service control systems were identified as the cause of 24 % of all major failures. Circuit breaker controls have typically become more complicated in recent years and have many special requirements for each utility customer. Also in recent years circuit breaker control system functions have been expanding to include controlled switching, monitoring and diagnostics.

The actual activities of the group are:

- A questionnaire has been established in order to get more detailed information on failures on control circuits of high voltage circuit breakers
- On the base of a standard functional control scheme (block diagram) the differences of conventional controls in different parts of the world can be shown.
- Based on the questionnaire the WG Members made quite a numbers of interviews. They got information from 5 countries extern Europe and 8 countries within Europe. In total 25 utilities has been involved.

After evaluation of the questionnaire an overview of the main results and some hints of trends will be presented in a first publication in 2003.

Website of SC A3

Currently the website got a new face which is in line with the new Scope of SC A3. The website contains all relevant information to get an overview of the structure and technical work of the committee. It was finished in May 2003 and is implemented into the CIGRE website below the former designation SC 13. Keywords of the content are: mission and scope of SC A3, scopes of all working groups and overview of the other working bodies, members list, publications and protected members area containing SC-internal news and working documents.