STRATEGIC BUSINESS PLAN (SBP)

IEC/TC or SC	Secretariat	Date
TC 17	Sweden	November 2014

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Title of TC

High-voltage switchgear and controlgear

SC 17A: Equipment

SC 17C: Assemblies

A Background

TC 17 establishes and maintains standards on high-voltage switchgear and controlgear as well as their assemblies, together with associated control and/or power equipment, measuring and signalling equipment.

SC 17A prepares international standards, technical specifications and technical reports covering equipment having a rated voltage above 1 kV a.c. and/or above 1,5 kV d.c.

SC 17C prepares international standards, technical specifications and technical reports covering assemblies of equipment with associated control and power equipment, digital communication, measuring, signalling, protective, regulating equipment, etc. Interfaces such as connections to power transformers and gas-insulated transmission lines are also part of the scope of SC 17C.

B Business Environment

B.1 General

IEC Standardization for high-voltage switchgear and controlgear worldwide has reached a level far higher than that for most other types of equipment, today.

As the development of electric power systems is a key issue for less industrialized and developing countries, and as these countries to a large extent lack experienced personnel, IEC standards on high-voltage switchgear and controlgear also serve as means for the transfer of knowledge and as guideline for planning.

In many cases high-voltage switchgear and controlgear serves as the ultimate safety device in transmission and distribution networks. This aspect has great influence on the philosophy of work of the subcommittees dealing with high-voltage equipment and substations. Also, the interaction of high-voltage switchgear with networks and loads as well as the system's reaction to switching operations have to be taken into account.

Common to all types of switchgear are requirements for the utmost reliability. This leads to high levels of testing during development and manufacture which are based on comprehensive standards for type and routine tests.

The standards for the different spectra of products and applications of high-voltage switchgear and controlgear address, along with the manufacturers of the equipment, mainly two groups of users: in the field of high-voltage, utilities and industrial groups.

While, generally speaking, the manufacturers and testing facilitiers of high-voltage switchgear and controlgear are adequately represented in TC 17 and its subcommittees it would be desirable to have a more active participation from the users' side.

The evolution of high-voltage switchgear and controlgear technologies, the trends toward higher degrees of automation, the integration of various additional functions into primary equipment, the changing political environments – saving of energy, deregulation, etc. – and the growth of the

international trade require the maintenance of the existing as well as the development of new IEC standards on high- voltage switchgear and controlgear.

The implementation of renewable energy sources may lead to an expansion of the use of distributed generation, which may lead to an increased use of switchgear and controlgear the lower end of the “high-voltage” range.

B.2 Market demand

Global market expansions continue to create high demands for international standards on high-voltage switchgear and controlgear. Upon this background the harmonization of existing national standards through their integration into IEC is of major importance.

B.3 Trends in technology

No dramatic changes are foreseen in the principal technology of high-voltage switchgear and controlgear.

In high-voltage switchgear, electronic circuits are being incorporated for the integration of the switchgear into automated substation and network controls. Monitoring and life management aim at lowering the operatonal costs. High-voltage switchgear assemblies are installed to save space and further improve reliability.

Gas-insulated transmission lines (GIL) will be an alternative to overhead lines and cables particularly to transport high amounts of energy.

Political and economic constraints will reduce the safety margins, necessitate lower equipment and operational costs, and enforce development trends for higher reliability and availability.

Electromagnetic emission will have to be considered very carefully due to the higher complexity of the high-voltage switchgear and controlgear and the extensive application of electronic devices.

B.4 Market trends

Switchgear with voltage ratings higher than 800 kV have been installed in recent years. The current level is 1 100 kV, with 1 200 kV being in advanced stage. The object is to allow long distance bulk power transmission. These higher rated voltages are now covered in high-voltage switchgear standards and no further revision is expected regarding rated voltages.

The development of meshed DC networks could eventually lead to the standardization of high-voltage DC equipment but basic studies by CIGRE are needed first.

B.5 Ecological environment

The high performance and quality of the devices following the IEC standards and thus the equipment of SC17A and the assemblies of SC17C make them the most ecological solutions for power transmission and distribution.

As the TC 17, SC17A and SC17C standards are elaborated following a functional approach, various and optimized technical solutions are available. Their design, use of materials, shall comply with international and regional or local regulations in force in the countries where the equipment and the assemblies are put on the market.

The nature of the primary technologies of high-voltage switchgear and controlgear implies that practically all constructional elements can be recycled without limitations. There are no detrimental emissions during the switching process.

High-voltage switchgear and controlgear does not emit electromagnetic disturbances. Visual and acoustic impact is controlled closely.

C System approach aspects

The interaction of TC 17 with other TCs and SCs is given in Table 1.

The interaction of SC 17A with other TCs and SCs is given in Table 2.

The interaction of SC 17C with other TCs and SCs is given in Table 3.

Table 1 - Liaisons of TC 17 with other TCs/SCs

System Committees (TC 17 role as a customer)	TC 10 - Fluids for electrotechnical applications TC 15 - Solid electrical insulating materials TC 28 – Insulation coordination TC 36 - Insulators SC 36A - Insulated bushings SC 36C - Insulators for substations TC 77 - Electromagnetic compatibility TC112 - Evaluation and qualification of electrical insulating materials and systems TC 121A – Low-voltage switchgear and controlgear
System Committees (TC 17 role as supplier)	SC 32A - High-voltage fuses TC 33 - Power capacitors and their applications TC 99 - System engineering and erection of electrical power installations in systems with nominal voltages above 1 kV a.c. and 1,5 kV d.c., particularly concerning safety aspects
Other Committees (TC 17 in contact with for technical consistency)	TC 9 - Electrical equipment and systems for railways TC 28 - Insulation co-ordination TC 42 - High-voltage and high-current test techniques

Table 2 - Liaisons of SC 17A with other TCs/SCs

System Committees (SC 17A role as a customer)	TC 10 - Fluids for electrotechnical applications TC 15 - Solid electrical insulating materials TC 36 - Insulators SC 36A - Insulated bushings SC 36C - Insulators for substations TC 77 - Electromagnetic compatibility TC112 - Evaluation and qualification of electrical insulating materials and systems TC 121A – Low-voltage switchgear and controlgear
System Committees (SC 17A role as supplier)	SC 17C - High-voltage switchgear and controlgear assemblies SC 32A - High-voltage fuses TC 33 - Power capacitors and their applications TC 99 - System engineering and erection of electrical power installations in systems with nominal voltages above 1 kV a.c. and 1,5 kV d.c., particularly concerning safety aspects
Other Committees (SC 17A in contact with for technical consistency)	TC 9 - Electrical equipment and systems for railways TC 28 - Insulation co-ordination TC 42 - High-voltage and high-current test techniques

Table 3 - Liaisons of SC 17C with other TCs/SCs

System Committees (SC 17C role as a customer)	TC 1 – Terminology TC 2 - Rotating machinery TC 8 - Systems aspects for electrical energy supply TC 10 - Fluids for electrotechnical applications SC 17A - High-voltage switchgear and controlgear TC 28 - Insulation co-ordination SC 32A - High-voltage fuses SC 36A - Insulated bushings TC 38 - Instrument transformers TC 42 - High-voltage and high-current test techniques TC 99 - System engineering and erection of electrical power installations in systems with nominal voltages above 1kV a.c. and 1,5kV d.c., particularly concerning safety aspects TC 106 - Methods for the assessment of electric, magnetic and electromagnetic fields associated with human exposure TC 111 - Environmental standardization for electrical and electronic products and systems TC 121A – Low-voltage switchgear and controlgear
System Committees (SC 17C role as supplier)	TC 14 - Power transformers SC 17A - High-voltage switchgear and controlgear SC 32A - High-voltage fuses SC 36A - Insulated bushings TC 37 - Surge arresters TC 38 - Instrument transformers
Other Committees (SC 17C in contact with for technical consistency)	TC 18 - Electrical installations of ships and of mobile and fixed offshore units TC 78 - Live working

SC 17A has external liaisons with CIGRE Study Committee A3 (Category A), the Short-circuit Testing Liaison (Category A) and to further promote the harmonisation of IEEE and IEC standards in the field of the equipment a category D has been established between SC 17A and the IEEE Switchgear Committee.

SC 17C has category A liaison with CIGRE Study Committee B3 Substations.

To further promote the harmonisation of IEEE and IEC standards in the field of Gas Insulated Switchgear (GIS) and Substations Communications, SC 17C has established the following category D liaisons:

- IEEE/PES Substations Subcommittee K0 GIS with IEC SC 17C MT 16 HV-GIS;
- IEEE/PES Substations Subcommittee C0 Data Acquisition, Processing, and Control Systems with IEC SC 17C MT 30 Digital Communication in Substations;
- IEEE/PES Switchgear Committee with IEC SC 17C MT 14 MV-GIS.

D Objectives and strategies (3 to 5 years)

To continue the updating of documents falling under the responsibility of TC 17 to reflect any new and/or changing technologies that may appear on the market and to take into account the experience in service and/or in testing.

The work of TC 17 will focus mainly on revising the common specifications document (IEC 62271-1), which is foreseen to be published in 2017. TC 17 will closely cooperate with TC 10, who is in the process of revising IEC 60376 and IEC 60480. The publication of the revised standards will require a revision of IEC 62271-4. SC17C is closely cooperating with TC 78 in the process to revise IEC 62271-206 (SC17C) together with IEC 61243-5 (TC 78).

To encourage and improve participation of experts from National Committees that are presently under-represented.

No dramatic changes are foreseen in the technology of equipment and SC 17A will focus on updating its standards to the coming revision of IEC 62271-1.SC 17C will continue to evaluate its standards through advisory group AWG 20. The standards of SC 17C will require updating once the revised IEC 62271-1 is published.

E Action plan

Continuous maintenance of the existing standards falling under the responsibility of TC17 (see also D).

Encourage more frequent use of electronic tools (e.g. web conferencing) that allow participation without travels, and promote the work of TC 17 during conferences held in under-represented countries.

F Useful links to IEC web site

TC 17 dashboard giving access to Membership, TC/SC Officers, Scope, Liaisons, WG/MT/PT structure, Publications issued along with their Stability Dates, Work Programme and similar information for SCs, if any.

Name or signature of the secretary

A. Bosma