IEC/TC or SC	Secretariat	Date
37	US	2014-06-13

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Title of TC
Surge Arresters

A Background

IEC TC37 is concerned with high-voltage surge arresters for the protection of electrical supply systems and with low-voltage surge protection devices (SPDs) for the protection of electrical supply systems and installations.

The scope of the Main Committee is as follows:

- To prepare international standards regarding:
  - Specifications for surge arresters and other surge protective devices (SPDs).
  - The choice of surge arresters to provide adequate protection of the system with satisfactory reliability, and the definitions of conditions of use enabling this result to be obtained

The Main Committee has two subcommittees 37A (Low-Voltage Surge Protective Devices) and 37B (Specific Components for Surge Arresters and Surge Protective Devices). The scopes of the subcommittees are as follows:

SC37A

- To prepare international standards for surge protective devices (SPDs) for protection against indirect and direct effects of lightning and/or against other transient overvoltages and for information on their selection and application. These devices are to be used in power, telecommunications and/or signalling networks with voltages up to 1 000 V a.c. or 1 500 V d.c. Requirements for selection and erection of SPDs in electrical installations of buildings as covered by TC64 are excluded.

SC37B

- To prepare international standards for components used in SPDs. These SPDs are used in power, telecommunications and/or signalling networks with voltages up to 1 000 V a.c. or 1 500 V d.c.

The Main Committee was established in July 1951
Subcommittee 37A was established in October 1988
Subcommittee 37B was established in November 1992

B Business Environment

B.1 General

Surge Arresters and applied on medium voltage (MV), high voltage (HV) and ultra-high voltage (UHV) electric systems to ensure, as far as possible, the maintenance of an uninterrupted supply of electricity to users, in the presence of overvoltages such as lightning surges, switching surges and temporary overvoltages. SPDs are used in low voltage (LV) installations to protect equipment that is vulnerable to overvoltages. In all electrical environments, these products improve the reliability of equipment and services through overvoltage control.

The Technical Committee and its Subcommittees set technical requirements and testing methods to check the compliance to protective limits and to other performance aspects associated with the durability of the surge arrester or SPD.

Solid-state and discharge type SPDs are used in low voltage equipment which is vulnerable to overvoltages. Matters dealing with the use of SPDs to protect against overvoltages and transient events are addressed by SC37A. Requirements for components used in SPDs are addressed by SC37B.

B.2 Market demand

The market for surge arresters and SPDs is worldwide. The customers for the surge arrester and SPD products covered by the Technical Committee and its Subcommittees include electric utilities, industrial users and general consumers.

General consumers make primary use of the low voltage SPDs. Users of SPDs are typically different from users of high voltage surge arresters since the products have somewhat different applications and are not used under the same conditions. In the high voltage area up to UHV levels, the user, typically having technical knowledge, is more deeply involved in performance specifications and system designs. The general public (i.e., the usual user of the low voltage devices) is less technically sophisticated in this product area and relies heavily upon manufacturer technical capability. General consumers make primary use of portable low voltage SPDs. TC37 and its Subcommittee membership reflect those interests and alignments and are responsive to all requests for participation. The general public consumers sector input is received through comments from relevant IEC horizontal and product committees (TC109, TC64, TC81, and TC112) and test labs.

The market for low voltage SPDs is rapidly expanding, In contrast, the market for high voltage surge arresters is more stable and more mature. The pervasion of broadband communications has resulted in a demand for lower capacitance SPDs.

B.3 Trends in technology

TC37: While there may be small pockets of production of high voltage surge arresters using silicon-carbide non-linear resistors, the overwhelming majority of arresters being produced today are based on metal-oxide non-linear varistor technology. The use of polymer materials as an alternative to porcelain for the housings of arresters intended for outdoor is finding increasing acceptance by users. The need to transmit very large amounts of power over long distances is spurring more use of UHVAC and HVDC transmission systems, stimulating the need for surge arresters to protect equipment operating at very high AC and DC voltages. Such needs have been taken into consideration in recent work by TC37.

SC37A: Low-voltage SPDs are evolving into products that provide surge diversion, harmonic filtering and both overload and thermal protection. The widespread use of dc systems, such as in photovoltaic products, have placed an increased need to expand standardization efforts in the application of SPDs in this industry sector.

SC37B: New developments are taking place in surge protection components that are used in SPDs. Trends are in miniaturization, surface mount and increased component complexity. Isolation transformers being used to mitigate surges.

B.4 Market trends

TC37: Medium voltage and high voltage arresters have historically been used, and will continue to be used, to protect electrical equipment installed on MV distribution systems and in HV substations. With more and more focus being given to system reliability and continuance of service, there is increasing use of surge arresters on both MV and HV lines to prevent outages due to lightning-induced flashover. In certain parts of the world, where very long transmission lines are being operated at much higher voltages than previously

used (UHV levels), there is an increasing market for surge arresters with lower per unit protection levels and much higher energy handling capabilities than have been generally available in the past. Expanded interest in high-voltage DC transmission, requiring HVDC converter stations, for delivering power over great distances will continue to expand the market for surge arresters to handle the unique requirements of such systems.

SC37A: The proliferation of sensitive electronic equipment connected to low-voltage power systems and dc power systems is increasing the need for the application of SPDs. Multi-port SPDs are being deployed for surge protection of power, telephone, coaxial cable and, likely, fiber-optic communications circuits.

SC37B: Increased interest in Low Voltage DC. Other trends will increase demand for surge protection components:

- Increased interest in wind power and photovoltaics
- Increased use in power line communication
- Increase in smart grid technology
- Increased deployment of high speed data links
- Moving the central office closer to the end customer to be able to deliver broadband and high speed data.

B.5 Ecological environment

The nature of the primary technology of surge arresters implies that most constructional elements and components can be recycled without limitation. There are no detrimental emissions in normal use. Care is taken to avoid the use of toxic materials or materials which may produce toxic by-products. However, life cycle assessment studies, in progress within the scientific community, may provide TC37 with insight into not now available additional environmental issues that occur during the entire life cycle of the surge arrester that may need to be addressed. EMC considerations are included in TC and SC documents. Requirements of RoHS need to be taken into account during the entire life cycle of considered equipment.

C System approach aspects

The surge protective products covered by TC37 and its Subcommittees are found throughout the electricity supply system, from generating station to consumer, thereby creating a connection with many other IEC Technical Committees. The system approach relevant to TC37 and its Subcommittees as follows:

System Committees (TC37/SC37A/SC37B as supplier)	TC14	Power transformers
	SC17A	High voltage switchgear and controlgear
	TC33	Power capacitors and their applications
	TC82	Solar voltaic energy systems
	TC88	Wind turbines
	TC99	System engineering and erection of electric power installations in systems with nominal voltage above 1 kV a.c. and 1.5 kV d.c., particularly concerning safety aspects
	TC64	Electrical installations and protection against electric shock
	TC81	Lightning protection
Other Committees	TC9	Electrical equipment and systems for railways
	TC28	Insulation coordination
	TC33	Power capacitors and their applications
	TC36	Insulators
	TC64	Electrical installations and protection against electrical shock

	TC89	Fire hazard testing
	TC109	Insulation coordination for low-voltage equipment
	TC112	Evaluation and qualification of electrical insulating materials and systems
	TC115	High voltage direct current (HVDC) transmission for DC voltages above 100 kV

Formal liaisons with other organizations are listed in the TC37, SC37A and SC37B portions of the IEC website (see F. Useful links to IEC web site).

D Objectives and strategies (3 to 5 years)
TC37:
To continue revision of existing standards to address limitations identified by users and to introduce new standards to address requirements for arresters for special applications.

Continue work to develop “rationale” that explains the background of surge arrester test procedures, to provide a basis of understanding of the relevance and significance of the prescribed tests, with the objective of creating a continuing legacy to aid newer WG and MT experts, thereby minimizing the loss of knowledge as longer-term experts retire. The plan is to publish this in the form of a Technical Report (TR).

Update application guide IEC 60099-5 Ed. 2.0 to reflect significant changes that will be contained in testing standard IEC 60099-4 Ed.3.0 to be published in the second half of 2014, and to address other applications (such as statcom, series compensation and shunt reactors/capacitors).

Review and promote ideas for functioning of the TC to attract participation from more NCs.

SC37A:
To regularly update committee standards to reflect changing requirements and technology for protection against the direct and indirect effects of lightning and/or other transient overvoltages.

SC37B:

To continue to develop requirements and testing criteria as well as application guidance for SPCs in LV power, telecommunications/data communications, and special applications.

E Action plan
TC37:

Update IEC 60099-5 Ed.2.0 as explained above. Goal is to have FDIS in 2016.

Amend IEC 60099-6 Ed.1.0 to address new matters. Targeted for 2016.

Work on technical matters raised during voting on CDV and FDIS for IEC 60099-4 Ed.3.0, with view to address next revision of the document.

Establish formal liaisons with TC 9 and TC 33.

SC37A:
Update standard IEC 61643-12 to reflect revisions in IEC 61643-11, TOV and special constructions: Present CD by 2014

Update standard IEC 61643-22 and further development: CDV issued 2014-02; FDIS by 2016

New standard IEC 61643-31, testing and requirement of SPDs for PV: Present CD in 2014; FDIS by 2016
New standard IEC 61643-32, application of SPDs for PV: Present CD in 2014; FDIS by 2016

SC37B:

Update IEC 61643-321 as performance and test document. CD targeted for 2015
Develop IEC 61643-322 application guide. CD targeted for 2014; FDIS by 2017

Update IEC 61643-331 as performance and test document. CD issued 2014-01; FDIS by 2017
Develop IEC 61643-332 application guide. CD targeted for 2015; FDIS by 2018

Update IEC 61643-341 as performance and test document. CD targeted for 2014; FDIS by 2017
Develop IEC 61643-342 application guide. CD targeted for 2015; FDIS by 2018

F Useful links to IEC web site

TC37 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

Michael G. Comber