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Surge arresters – Part 5: Selection and application recommendations

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FOREWORD

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International Standard IEC 60099-5 has been prepared by committee 37: Surge arresters.

This second edition cancels and replaces the first edition published in 1996 and its amendment 1 published in 1999. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) Expanded discussion of different types of arresters and their application, including additions of discussion on:
   – transmission of line arresters
   – arresters for shunt capacitor switching
   – arresters for series capacitor protection
   – application of arresters between phases
   – connecting arresters in parallel
b) Addition of section on asset management, including:

- managing surge arresters in the power grid
- arrester maintenance
- significantly expanded discussion of performance diagnostic tools
- end-of-life considerations

c) New annexes dealing with:

- arrester modelling for system studies
- example of data needed for specifying arresters

The text of this standard is based on the following documents:

FDIS	Report on voting
37/405/FDIS	37/408/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

SURGE ARRESTERS –

Part 5: Selection and application recommendations

1 Scope

This part of IEC 60099 is not a mandatory standard but provides information, guidance, and recommendations for the selection and application of surge arresters to be used in three-phase systems with nominal voltages above 1 kV. It applies to gapless metal-oxide surge arresters as defined in IEC 60099-4, to surge arresters containing both series and parallel gapped structure – rated 52 kV and less as defined in IEC 60099-6 and metal-oxide surge arresters with external series gap for overhead transmission and distribution lines (EGLA) as defined in IEC 60099-8. In Annex H, some aspects regarding the old type of SiC gapped arresters are discussed.

The principle of insulation coordination for an electricity system is given in IEC 60071 and IEC 60071-2 standards. Basically the insulation coordination process is a risk management aiming to ensure the safe, reliable and economic design and operation of high voltage electricity networks and substations. The use of surge arrester helps to achieve a system and equipment insulation level and still maintaining an acceptable risk and the best economic of scale.

The introduction of analytical modelling and simulation of power system transients further optimise the equipment insulation level. The selection of surge arresters has become more and more important in the power system design and operation. It is worthwhile to note that the reliability of the power system and equipment is dependent on the safety margin adopted by the user in the design and selection of the equipments and surge arresters.

Surge arrester residual voltage is a major parameter of which most users have paid a lot of attention to when selecting the type and rating. The typical maximum surge arresters residual voltage are given in Annex F. It is likely, however, that for some systems, or in some countries, the system reliability requirements and design are sufficiently uniform that the recommendations of the present standard may lead to the definition of narrow ranges of arresters. The user of surge arresters will, in that case, not be required to apply the whole process introduced here to any new installation and the selection of characteristics resulting from prior practice may be continued.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60071-1:2006, *Insulation coordination – Part 1: Definitions, principles and rules*

IEC 60071-2:1996, *Insulation coordination – Part 2: Application guide*

IEC/TR 60071-4, *Insulation coordination – Part 4: Computational guide to insulation coordination and modelling of electrical networks*

IEC 60099-4:2009, *Surge arresters – Part 4: Metal-oxide surge arresters without gaps for a.c. systems*

IEC 60099-6:2002, *Surge arresters – Part 6: Surge arresters containing both series and parallel gapped structures – Rated 52 kV and less*

IEC 60099-8:2011, *Surge arresters – Part 8: Metal-oxide surge arresters with external series gap (EGLA) for overhead transmission and distribution lines of a.c. systems above 1 kV*

IEC 60507, *Artificial pollution tests on high-voltage insulators to be used on a.c. systems*

IEC/TS 60815-1, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 1: Definitions, information and general principles*

IEC/TS 60815-2, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 2: Ceramic and glass insulators for a.c. systems*

IEC/TS 60815-3, *Selection and dimensioning of high-voltage insulators intended for use in polluted conditions – Part 3: Polymer insulators for a.c. systems*

IEC 62271-1, *High-voltage switchgear and controlgear – Part 1: Common specifications*

IEC 62271-200, *High-voltage switchgear and controlgear – Part 200: AC metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV*

IEC 62271-203, *High-voltage switchgear and controlgear – Part 203: Gas-insulated metal-enclosed switchgear for rated voltages above 52 kV*