

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Surge arresters – **STANDARD PREVIEW**
Part 6: Surge arresters containing both series and parallel gapped structures –
System voltage of 52 kV and less
(standards.iteh.ai)

Parafoudres – [IEC 60099-6:2019](https://standards.iteh.ai/catalog/standards/sist/5db4a381-f1e9-46b6-b636-2116027970c1/iec-60099-6-2019)
Partie 6: Parafoudres contenant des structures à éclateurs en série et en
parallèle – Tension de réseau inférieure ou égale à 52 kV



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SURGE ARRESTERS –**Part 6: Surge arresters containing both series and parallel gapped structures – System voltage of 52 kV and less**

FOREWORD

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International Standard IEC 60099-6 has been prepared by IEC technical committee 37: Surge arresters.

This second edition cancels and replaces the first edition published in 2002. This edition constitutes a technical revision.

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

- a) A new concept of arrester classification and energy withstand testing was introduced: the line discharge classification was replaced by a classification based on repetitive charge transfer rating (Q_{rs}) and thermal charge transfer rating (Q_{th}). The new concept clearly differentiates between impulse and thermal energy handling capability, which is reflected in the requirements as well as in the related test procedures.

- b) Power-frequency voltage versus time tests – with and without prior duty – were introduced as type tests.
- c) Requirements and tests on disconnectors were added.
- d) Definitions for new terms have been added.
- e) Clause 10 contains particular requirements for polymer-housed surge arresters. These are indicated in the form of replacements, additions or amendments to the original clauses or subclauses concerned.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
37/450/FDIS	37/451/RVD

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

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

A list of all parts in the IEC 60099 series, published under the general title *Surge arresters*, can be found on the IEC website.

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

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- withdrawn,
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INTRODUCTION

This part of IEC 60099 presents the minimum criteria for the requirements and testing of metal-oxide surge arresters containing gapped structures that are applied to AC power systems with U_s above 1 kV up to and including 52kV.

Arresters covered by this document can be applied to overhead installations in place of the non-linear type arresters covered in IEC 60099-4.

An accelerated ageing procedure is incorporated in this document to simulate the long-term effects of voltage and temperature on the arrester. This is necessary since during the arrester's service life the gaps and resistor elements will have portions of the system power frequency voltage continuously applied across them.

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SURGE ARRESTERS –

Part 6: Surge arresters containing both series and parallel gapped structures – System voltage of 52 kV and less

1 Scope

This part of IEC 60099 applies to non-linear metal-oxide resistor type surge arresters with spark gaps designed to limit voltage surges on AC power circuits with system voltages U_s above 1 kV up to and including 52 kV. This document basically applies to all metal-oxide distribution class surge arresters with internal series and/or parallel gaps and housed in either porcelain or polymeric housings.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60060-1, *High-voltage test techniques – Part 1: General definitions and test requirements*

IEC 60060-2, *High-voltage test techniques – Part 2: Measuring systems*

IEC 60068-2-11:1981, *Basic environmental testing procedures – Part 2-11: Tests – Test Ka: Salt mist*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60071-2:2018, *Insulation co-ordination – Part 2: Application guidelines*

IEC 60270, *High-voltage test techniques – Partial discharge measurements*

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 62217, *Polymeric HV insulators for indoor and outdoor use – General definitions, test methods and acceptance criteria*

ISO 4287, *Geometrical Product Specifications (GPS) – Surface texture: Profile method – Terms, definitions and surface texture parameters*

ISO 4892-1, *Plastics – Methods of exposure to laboratory light sources – Part 1: General guidance*

ISO 4892-2, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 4892-3, *Plastics – Methods of exposure to laboratory light sources – Part 3: Fluorescent UV lamps*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

acceptance test

test made on arresters or representative samples after agreement between manufacturer and user

3.2

arrester disconnecter

device for disconnecting an arrester from the system in the event of arrester failure, to prevent a persistent fault on the system and to give visible indication of the failed arrester

Note 1 to entry: Clearing of the fault current through the arrester during disconnection generally is not a function of the device.

3.3

bending moment

force perpendicular to the longitudinal axis of an arrester multiplied by the vertical distance between the mounting base (lower level of the flange) of the arrester and the point of application of the force

3.4

breaking load

force perpendicular to the longitudinal axis of a porcelain-housed or cast resin arrester leading to mechanical failure of the arrester housing

3.5

cast resin housed arrester

arrester using a housing made from only one organic based material (e.g. cycloaliphatic epoxy) that fractures similarly to a porcelain housing under mechanical overstress

3.6

continuous current of an arrester

current flowing through the arrester when energized at the continuous operating voltage

3.7

continuous operating voltage of an arrester

U_c

designated permissible RMS value of power-frequency voltage that may be applied continuously between the arrester terminals in accordance with 8.5

3.8

damage limit

<mechanical>

lowest value of a force perpendicular to the longitudinal axis of a polymer-housed arrester leading to mechanical failure of the arrester housing

3.9 designation of an impulse shape

combination of two numbers, the first representing the virtual front time (T_1) and the second the virtual time to half-value on the tail (T_2)

Note 1 to entry: This is written as T_1/T_2 , both in microseconds, the sign "/" having no mathematical meaning.

3.10 discharge current of an arrester

impulse current which flows through the arrester

3.11 disruptive discharge

phenomenon associated with the failure of insulation under electric stress, which includes a collapse of voltage and the passage of current

Note 1 to entry: The term applies to electrical breakdowns in solid, liquid and gaseous dielectric, and combinations of these.

Note 2 to entry: A disruptive discharge in a solid dielectric produces permanent loss of electric strength. In a liquid or gaseous dielectric the loss may be only temporary.

3.12 distribution class arrester

arrester intended for use on distribution systems, typically of $U_s \leq 52$ kV, to protect components primarily from the effects of lightning

Note 1 to entry: Distribution class arresters may have nominal discharge currents, I_n , of 2,5 kA; 5 kA or 10 kA.

Note 2 to entry: Distribution arresters are classified as "Distribution DH", "Distribution DM" and "Distribution DL" (see Table 1).

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3.13 electrical unit

portion of an arrester in which each end of the unit is terminated with an electrode which is exposed to the external environment

3.14 fault indicator

device intended to provide an indication that the arrester is faulty and which does not disconnect the arrester from the system

3.15 flashover

disruptive discharge over a solid surface

3.16 follow current

current from the connected power source that flows through an arrester during and following the passage of discharge current

3.17 front of an impulse

part of an impulse which occurs prior to the peak

3.18 high current impulse

<of an arrester> peak value of discharge current having a 4/10 impulse shape which is used to test the stability of the arrester on direct lightning strokes

**3.19
housing**

external insulating part of an arrester, which provides the necessary creepage distance and protects the internal parts from the environment

Note 1 to entry: A housing may consist of several parts providing mechanical strength and protection against the environment.

**3.20
impulse**

unidirectional wave of voltage or current which, without appreciable oscillations, rises rapidly to a maximum value and falls, usually less rapidly, to zero with small, if any, excursions of opposite polarity, with defining parameters being polarity, peak value, front time and time to half-value

**3.21
insulating base**

a short insulator (or set of insulators) on which the arrester is mounted to provide a means of connecting a current monitoring device between the base of the arrester and earth

**3.22
internal grading components of an internally gapped arrester**

grading impedances, connected in parallel with the internal gap(s), to control the voltage across the gap section

**3.23
internal parts**

MO resistor with supporting structure and internal grading system, if equipped

**3.24
lightning current impulse**

8/20 current impulse with limits on the adjustment of equipment such that the measured values are from 7 μs to 9 μs for the virtual front time and from 18 μs to 22 μs for the time to half-value

Note 1 to entry: The time to half-value is not critical and may have any tolerance during the residual voltage type tests (see 8.3.2.3).

**3.25
lightning impulse discharge**

an approximately sine half-wave current impulse having a time duration within 200 μs to 230 μs during which the instantaneous value of the impulse current is greater than 5 % of its peak value

**3.26
lightning impulse protection level
LIPL or U_{pl}**

the maximum residual voltage of the arrester for the nominal discharge current

**3.27
long-duration current impulse**

rectangular current impulse which rises rapidly to maximum value, remains substantially constant for a specified period and then falls rapidly to zero, with defining parameters being polarity, peak value, virtual duration of the peak and virtual total duration.

**3.28
mean breaking load
MBL**

the average breaking load for porcelain or cast resin-housed arresters determined from tests

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