



# SLOVENSKI STANDARD

## SIST EN 60099-4:1998

01-april-1998

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**Prenapetostni odvodniki - 4. del: Kovinsko-oksidni prenapetostni odvodniki brez iskrišč za sisteme z izmenično napetostjo (IEC 60099-4:1991)**

Surge arresters -- Part 4: Metal-oxide surge arresters without gaps for a.c. systems

Überspannungsableiter -- Teil 4: Metalloxidableiter ohne Funkenstrecken für Wechselspannungsnetze

Parafoudres -- Partie 4: Parafoudres à oxyde métallique sans éclateur pour réseaux à courant alternatif

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SIST EN 60099-4:1998

Ta slovenski standard je istoveten z: **EN 60099-4:1993**

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**ICS:**

29.240.10      Transformatorske postaje.      Substations. Surge arresters  
Prenapetostni odvodniki

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**en**

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EUROPEAN STANDARD

EN 60099-4

NORME EUROPEENNE

EUROPÄISCHE NORM

August 1993

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Descriptors: Surge arresters, metal-oxide surge arresters without gaps,  
a.c. systems

## ENGLISH VERSION

Surge arresters  
Part 4: Metal-oxide surge arresters without gaps  
for a.c. systems  
(IEC 99-4:1991)

Parafoudres  
Partie 4: Parafoudres à oxyde  
métallique sans éclateur pour  
réseaux à courant alternatif  
(CEI 99-4:1991)

Überspannungsableiter  
Teil 4: Metalloxidableiter ohne  
Funkenstrecken für  
Wechselspannungsnetze  
(IEC 99-4:1991)

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This European Standard was approved by CENELEC on 1993-07-06. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

## CENELEC

European Committee for Electrotechnical Standardization  
Comité Européen de Normalisation Electrotechnique  
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B-1050 Brussels

## FOREWORD

The CENELEC questionnaire procedure, performed for finding out whether or not the International Standard IEC 99-4:1991 could be accepted without textual changes, has shown that no common modifications were necessary for the acceptance as European Standard.

The reference document was submitted to the CENELEC members for formal vote and was approved by CENELEC as EN 60099-4 on 6 July 1993.

The following dates were fixed:

- latest date of publication of  
an identical national standard (dop) 1994-08-01
- latest date of withdrawal of  
conflicting national standards (dow) 1994-08-01

For products which have complied with the relevant national standard before 1994-08-01, as shown by the manufacturer or by a certification body, this previous standard may continue to apply for production until 1999-08-01.

Annexes designated "normative" are part of the body of the standard. Annexes designated "informative" are given only for information. In this standard, annexes A, B, C, D and ZA are normative and annexes E, F, G, H, J and K are informative.

## ENDORSEMENT NOTICE

The text of the International Standard IEC 99-4:1991 was approved by CENELEC as a European Standard without any modification.

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## ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD  
WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
60-1	1989	High-voltage test techniques Part 1: General definitions and test requirements (Corrigendum 1990 and 1992)	HD 588.1 S1	1991
71-2	1976	Insulation co-ordination - Part 2: Application guide	HD 540.2 S1	1991
99-1	1991	Surge arresters - Part 1: Non-linear resistor type gapped surge arresters for a.c. systems	-	-
99-3	1990	Part 3: Artificial pollution testing of surge arresters	-	-
270	1981	Partial discharge measurements	-	-
815	1986	Guide for the selection of insulators in respect of polluted conditions	-	-

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NORME  
INTERNATIONALE  
INTERNATIONAL  
STANDARD

CEI  
IEC  
99-4

Première édition  
First edition  
1991-11

**Parafoudres**

**Partie 4:**

Parafoudres à oxyde métallique sans éclateur  
pour réseaux à courant alternatif

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**Surge arresters**

**Part 4:**

Metal-oxide surge arresters without gaps for a.c.  
systems

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Commission Electrotechnique Internationale  
International Electrotechnical Commission  
Международная Электротехническая Комиссия

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For price, see current catalogue

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

## SURGE ARRESTERS

Part 4: Metal-oxide surge arresters without gaps  
for a.c. systems

## FOREWORD

- 1) The formal decisions or agreements of the IEC on technical matters, prepared by Technical Committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 2) They have the form of recommendations for international use and they are accepted by the National Committees in that sense.
- 3) In order to promote international unification, the IEC expresses the wish that all National Committees should adopt the text of the IEC recommendation for their national rules in so far as national conditions will permit. Any divergence between the IEC recommendation and the corresponding national rules should, as far as possible, be clearly indicated in the latter.

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This part of International Standard IEC 99 has been prepared by IEC Technical Committee No. 37: Surge arresters.

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

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DIS	Report on Voting
37(CO)38	37(CO)45

Full information on the voting for the approval of this part can be found in the Voting Report indicated in the above table.

Annexes A, B, C and D form an integral part of this standard.

Annexes E, F, G, H, J and K are for information only.

## INTRODUCTION

This International Standard presents the minimum criteria for the requirements and testing of gapless metal-oxide surge arresters that are applied to a.c. power systems.

Arresters covered by this standard are commonly applied to live/front overhead installations in place of the non-linear resistor type gapped arresters covered in IEC 99-1. Protection of low-voltage circuits, below 3 kV, is under consideration.

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

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## SURGE ARRESTERS

### Part 4: Metal-oxide surge arresters without gaps for a.c. systems

#### SECTION 1: GENERAL

##### 1.1 Scope

This International Standard applies to non-linear metal-oxide resistor type surge arresters without spark gaps designed to limit voltage surges on a.c. power circuits.

This standard basically applies to all metal-oxide surge arresters; however, polymeric housed, GIS, liquid immersed and other special designs may require special consideration in design, test and application.

##### 1.2 Normative references

**STANDARD PREVIEW**  
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The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60-1: 1989, *High-voltage test techniques. Part 1: General definitions and test requirements.*

IEC 71: *Insulation co-ordination.*

IEC 71-2: 1976, *Insulation co-ordination. Part 2: Application guide.*

IEC 99-1: 1991, *Surge arresters. Part 1: Non-linear resistor type gapped arresters for a.c. systems.*

IEC 99-3: 1990, *Surge arresters. Part 3: Artificial pollution testing of surge arresters.*

IEC 270: 1981, *Partial discharge measurements.*

IEC 815: 1986, *Guide for the selection of insulators in respect of polluted conditions.*

## SECTION 2: DEFINITIONS

For the purpose of this International Standard, the following definitions apply.

### 2.1 Metal-oxide surge arrester without gaps

An arrester having non-linear metal-oxide resistors connected in series and/or in parallel without any integrated series or parallel spark gaps.

### 2.2 Non-linear metal-oxide resistor

The part of the surge arrester which by its non-linear voltage versus current characteristics acts as a low resistance to overvoltages, thus limiting the voltage across the arrester terminals, and as a high resistance at normal power frequency voltage.

### 2.3 Internal grading system of an arrester

Grading impedances, in particular grading capacitors connected in parallel to one single or to a group of non-linear metal-oxide resistors, to control the voltage distribution along the metal-oxide resistor stack.

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### 2.4 Grading ring of an arrester

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A metal part, usually circular in shape, mounted to modify electrostatically the voltage distribution along the arrester.

### 2.5 Section of an arrester

A complete, suitably assembled part of an arrester necessary to represent the behaviour of a complete arrester with respect to a particular test. A section of an arrester is not necessarily a unit of an arrester.

### 2.6 Unit of an arrester

A completely housed part of an arrester which may be connected in series and/or in parallel with other units to construct an arrester of higher voltage and/or current rating. A unit of an arrester is not necessarily a section of an arrester.

### 2.7 Pressure relief device of an arrester

Means for relieving internal pressure in an arrester and preventing violent shattering of the housing following prolonged passage of fault current or internal flashover of the arrester.

## 2.8 Rated voltage of an arrester ( $U_r$ )

The maximum permissible r.m.s. value of power frequency voltage between its terminals at which it is designed to operate correctly under temporary overvoltage conditions as established in the operating duty tests, see 7.5. The rated voltage is used as a reference parameter for the specification of operating characteristics.

NOTE - The rated voltage as defined in this document is the 10 s power frequency voltage used in the operating duty test after high current or long duration impulses. Tests used to establish the voltage rating in IEC 99-1, as well as some National Standards, involve the application of repetitive impulses at nominal current with power frequency voltage applied. Attention is drawn to the fact that these two methods used to establish rating do not necessarily produce equivalent values. (A resolution to this discrepancy is under consideration.)

## 2.9 Continuous operating voltage of an arrester ( $U_c$ )

The continuous operating voltage is the designated permissible r.m.s. value of power frequency voltage that may be applied continuously between the arrester terminals in accordance with 7.5.

## 2.10 Rated frequency of an arrester

The frequency of the power system on which the arrester is designed to be used.

## 2.11 Disruptive discharge

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The phenomena associated with the failure of insulation under electric stress, which include a collapse of voltage and the passage of current. The term applies to electrical breakdowns in solid, liquid and gaseous dielectric, and combinations of these.

NOTE - 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.

## 2.12 Puncture (breakdown)

A disruptive discharge through a solid.

## 2.13 Flashover

A disruptive discharge over a solid surface.

## 2.14 Impulse

A 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.