
Prenapetostni odvodniki - 4. del: Kovinsko-oksidni prenapetostni odvodniki brez iskrišč za sisteme z izmenično napetostjo (IEC 60099-4:1991/A2:2001, spremenjen)

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

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EUROPEAN STANDARD

EN 60099-4/A2

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2002

ICS 29.120.50; 29.240.10

English version

Surge arresters

Part 4: Metal-oxide surge arresters without gaps for a.c. systems (IEC 60099-4:1991/A2:2001, modified)

Parafoudres

Partie 4: Parafoudres à oxyde métallique
sans éclateur pour réseaux
à courant alternatif
(CEI 60099-4:1991/A2:2001, modifiée)

Überspannungsableiter

Teil 4: Metalloxidableiter ohne
Funkenstrecken für
Wechselspannungsnetze
(IEC 60099-4:1991/A2:2001, modifiziert)

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This amendment A2 modifies the European Standard EN 60099-4:1993; it was approved by CENELEC on 2002-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, 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 text of amendment 2:2001 to the International Standard IEC 60099-4:1991, prepared by IEC TC 37, Surge arresters, together with the common modifications prepared by CLC/SR 37, was submitted to the formal vote and was approved by CENELEC as amendment A2 to EN 60099-4:1993 on 2002-09-01.

The following dates were fixed:

- latest date by which the amendment has to be implemented
at national level by publication of an identical
national standard or by endorsement (dop) 2003-09-01
- latest date by which the national standards conflicting
with the amendment have to be withdrawn (dow) 2005-09-01

Annexes designated "normative" are part of the body of the standard.

Annexes designated "informative" are given for information only.

In this standard, annexes A, B, C, D, F, N, O and ZA are normative and annexes E, G, H, J, K, L, M and ZB are informative.

Annexes ZA and ZB have been added by CENELEC.

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Endorsement notice

The text of amendment 2:2001 to the International Standard IEC 60099-4:1991 was approved by CENELEC as an amendment to the European Standard with agreed common modifications as given below.

COMMON MODIFICATIONS

Table of contents

Delete Section 12 and **replace** by "void".

Add Annex ZB (informative) "Liquid-immersed arresters"

SECTION 12: LIQUID-IMMERSED ARRESTERS

Delete Section 12 and **replace** by "void".

Annexes

Replace the existing Annex ZA by the following and **add** the text of Section 12 as Annex ZB.

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60060-1 + corr. March	1989 1990	High-voltage test techniques Part 1: General definitions and test requirements	HD 588.1 S1	1991
IEC 60068-2-11	1981	Environmental testing Part 2: Tests - Test Ka: Salt mist	EN 60068-2-11	1999
IEC 60068-2-14	1984	Part 2: Tests - Test N: Change of temperature	EN 60068-2-14 ¹⁾	1999
IEC 60068-2-17	1994	Part 2: Tests - Test Q: Sealing	EN 60068-2-17	1994
IEC 60068-2-42	1982	Part 2: Tests - Test Kc: Sulphur dioxide test for contacts and connections	-	-
IEC 60071-2	1996	Insulation co-ordination Part 2: Application guide	EN 60071-2	1997
IEC 60099-1	1991	Surge arresters Part 1: Non-linear resistor type gapped surge arresters for a.c. systems	EN 60099-1	1994
IEC 60099-3	1990	Part 3: Artificial pollution testing of surge arresters	-	-
IEC 60270	1981	Partial discharge measurements	EN 60270 ²⁾	2001
IEC 60298	1990	A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV and up to and including 52 kV	EN 60298 ³⁾ A11	1996 1999
IEC 60507	1991	Artificial pollution tests on high-voltage insulators to be used on a.c. systems	EN 60507	1993

¹⁾ EN 60068-2-14 includes A1:1986 to IEC 60068-2-14.

²⁾ EN 60270:2001 is based on IEC 60270:2000.

³⁾ EN 60298 includes corrigendum April 1995 + A1:1994 to IEC 60298.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60517	1990	Gas-insulated metal-enclosed switchgear for rated voltages of 72,5 kV and above	EN 60517 ⁴⁾ A11	1996 1999
IEC 60694	1996	Common specifications for high-voltage switchgear and controlgear standards	EN 60694	1996
IEC 60721-3-2	1997	Classification of environmental conditions Part 3: Classification of groups of environmental parameters and their severities - Section 2: Transportation	EN 60721-3-2	1997
IEC 60815	1986	Guide for the selection of insulators in respect of polluted conditions	-	-
IEC 61109	1992	Composite insulators for a.c. overhead lines with a nominal voltage greater than 1 kV - Definitions, test methods and acceptance criteria	-	-
IEC 61166	1993	High-voltage alternating current circuit-breakers - Guide for seismic qualification of high-voltage alternating current circuit-breakers	EN 61166	1993
IEC 61330	1995	High-voltage/low-voltage prefabricated substations	EN 61330	1996
IEEE C62.11	1999	IEEE Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits (> 1kV)	-	-

⁴⁾ EN 60517 includes corrigendum April 1995 + A1:1994 to IEC 60517.

Annex ZB
(informative)

Liquid-immersed arresters

Add the text of Section 12.

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NORME
INTERNATIONALE
INTERNATIONAL
STANDARD

CEI
IEC

60099-4

1991

AMENDEMENT 2
AMENDMENT 2
2001-10

Amendement 2

Parafoudres –

Partie 4:

**Parafoudres à oxyde métallique sans éclateur
pour réseaux à courant alternatif**

(standards.iteh.ai)

Amendment 2

<https://standards.iteh.ai/catalog/standards/sist/1619c4e8-cc73-46ef-a0f3-6611c1a-60099-4-1998-a2-2003>
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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*Pour prix, voir catalogue en vigueur
For price, see current catalogue*

FOREWORD

This amendment has been prepared by IEC technical committee 37: Surge arresters.

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

FDIS	Report on voting
37/268/FDIS	37/270/RVD

Full information on the voting for the approval of this amendment 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 3.

The committee has decided that the contents of the base publication and its amendments will remain unchanged until 2003. At this date, the publication will be:

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

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Replace the titles of 5.4, 5.5 and 5.11 by the following:

- 5.4 Internal partial discharge
- 5.5 Seal leak rate
- 5.11 Short-circuit

Add the following new subclause title:

- 5.14 Mechanical loads

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Add the following two new subclause titles:

- 7.7 Short-circuit tests
- 7.8 Internal partial discharge test

Add the following new sections 9, 10, 11, 12 and 13:

SECTION 9: TEST REQUIREMENTS ON POLYMER HOUSED SURGE ARRESTERS

- 9.1 General
- 9.2 Definitions
- 9.3 Identification and classification
- 9.4 Standard ratings

- 9.5 Requirements
- 9.6 General testing procedure
- 9.7 Type tests (design tests)

SECTION 10: TEST REQUIREMENTS ON GAS-INSULATED METAL ENCLOSED ARRESTERS (GIS ARRESTERS)

- 10.1 General
- 10.2 Definitions
- 10.3 Arrester identification (nameplate)
- 10.4 Standard rating
- 10.5 Requirements
- 10.6 General testing procedures
- 10.7 Type tests (design tests)
- 10.8 Routine tests
- 10.9 Tests after erection on site

SECTION 11: SEPARABLE AND DEADFRONT ARRESTERS

- 11.1 General
- 11.2 Definitions
- 11.3 Arrester identification
- 11.4 Standard ratings
- 11.5 Requirements
- 11.6 General testing procedure
- 11.7 Type tests (design tests)
- 11.8 Routine tests and acceptance tests

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SECTION 12: LIQUID-IMMERSED ARRESTERS

- 12.1 General
- 12.2 Definitions
- 12.3 Arrester identification
- 12.4 Standard ratings
- 12.5 Requirements
- 12.6 General testing procedure
- 12.7 Type tests (design tests)
- 12.8 Routine tests and acceptance tests

SECTION 13: MECHANICAL CONSIDERATIONS FOR SURGE ARRESTERS

- 13.1 General
- 13.2 Definitions
- 13.3 Identification and classification
- 13.4 Standard ratings
- 13.5 Requirements
- 13.6 General testing procedure
- 13.7 Type tests (design tests)

Add, after annex K, the following new annexes L, M, N and O:

Annex L (informative) Ageing test procedure – Arrhenius law – Problems with higher temperatures

Annex M (informative) Guide for the determination of the voltage distribution along metal-oxide surge arresters

Annex N (normative) Mechanical considerations

Annex O (informative) Short-circuit tests

Page 9

FOREWORD

Replace, in the penultimate line of the foreword, 'A, B, C and D' by 'A, B, C, D and N'.

Replace, in the last line of the foreword, 'E, F, G, H, J and K' by 'E, F, G, H, J, K, L, M and O'.

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1.1 Scope

Delete the second paragraph.

1.2 Normative references

[SIST EN 60099-4:1998/A2:2003](https://standards.iteh.ai/catalog/standards/sist/1619c4e8-ee73-46ef-a0f3-706f1ddc415a/sist-en-60099-4-1998-a2-2003)

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Insert, in the existing list, the following new references:

IEC 60068-2-11:1981, *Environmental testing – Part 2: Tests. Test Ka: Salt mist.*

IEC 60068-2-14:1984, *Environmental testing – Part 2: Tests. Test N: Change of temperature.*

IEC 60068-2-17:1994, *Basic environmental testing procedures – Part 2: Tests – Test Q: Sealing.*

IEC 60068-2-42:1982, *Environmental testing – Part 2: Tests. Test Kc: Sulphur dioxide test for contacts and connections.*

IEC 60071-2:1996, *Insulation co-ordination – Part 2: Application guide.*

IEC 60298:1990, *A.C. metal-enclosed switchgear and controlgear for rated voltages above 1 kV to and up to and including 52 kV.*

IEC 60517:1990, *Gas-insulated metal-enclosed switchgear for rated voltages of 72,5 kV and above.*

IEC 60694:1996, *Common specifications for high-voltage switchgear and controlgear standards.*

IEC 60721-3-2:1997, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 2: Transportation.*

IEC 61109:1992, *Composite insulators for a.c. overhead lines with a nominal voltage greater than 1 000 V – Definitions, test methods and acceptance criteria.*

IEC 61166:1993, *High-voltage alternating current circuit-breakers – Guide for seismic qualification of high-voltage alternating current circuit-breakers.*

IEC 61330:1995, *High-voltage/low voltage prefabricated substations.*

IEEE C62.11:1999, *Standard for Metal-Oxide Surge Arresters for Alternating Current Power Circuits.*

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SECTION 2: DEFINITIONS

Add, on page 27, the following new definitions:

2.46 Housing and sheds

2.46.1 Housing

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

NOTE A housing may consist of several parts providing mechanical strength and protection against the environment.

2.46.2 Shed

Insulating part projecting from the housing, intended to increase the creepage distance.

2.47 Polymer housed surge arrester

See subclause 2.60.

2.48 Fault indicator

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

2.49 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.

NOTE An electrical unit is identical to a "unit of an arrester" as defined in 2.6.

2.50 Mechanical unit

Portion of an arrester in which the resistors within the unit are mechanically restrained from moving in an axial direction.

2.51 Gas-insulated metal enclosed surge arrester (GIS-arrester)

Gas-insulated metal-enclosed metal-oxide surge arrester without any integrated series or parallel spark gaps, filled with gas other than air.

NOTE 1 The gas pressure is normally higher than 1 bar = 10^5 Pa.

NOTE 2 A surge-arrester used in gas-insulated switchgear.

2.52 Arrester – separable type (separable arrester)

Arrester assembled in an insulated or screened housing providing system insulation, intended to be installed in an enclosure for the protection of distribution equipment and systems. Electrical connection may be made by sliding contact or by bolted devices; however, all separable arresters are deadbreak arresters.

NOTE Separable arrester use is common European practice.

2.53 Arrester – deadfront type (deadfront arrester)

Arrester assembled in a shielded housing providing system insulation and conductive ground shield, intended to be installed in an enclosure for the protection of underground and pad mounted distribution equipment and circuits.

NOTE 1 Most deadfront arresters are loadbreak arresters.

NOTE 2 Deadfront arrester use is common U.S.A. practice.

2.54 Deadbreak arrester

Arrester which can be connected and disconnected from the circuit only when the circuit is de-energised.

2.55 Loadbreak arrester

Arrester which can be connected and disconnected when the circuit is energised.

2.56 Arrester – liquid-immersed type (liquid-immersed arrester)

Arrester designed to be immersed in an insulating liquid.

2.57 Fail-open current rating for liquid-immersed arrester

Fault current level above which the arrester is claimed to evolve into an open circuit upon failure.

[SIST EN 60099-4:1998/A2:2003](https://standards.iteh.ai/catalog/standards/sist/1619c4e8-ee73-46ef-a0f3-706f1d1415a/sist-en-60099-4-1998-a2-2003)

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2.58 Fail-short current rating for liquid-immersed arrester

Fault current level below which the arrester is claimed to evolve into a short-circuit upon failure.

NOTE Definitions 2.57 and 2.58 are preliminary and may be superseded by more general definitions.

2.59 Porcelain housed arrester

Arrester using porcelain as housing material, with fittings and sealing systems.

2.60 Polymer housed arrester

Arrester using polymeric and composite materials for housing, with fittings.

NOTE Designs with an enclosed gas volume are possible. Sealing may be accomplished by use of the polymeric material itself or by a separate sealing system.

2.61 Bending moment

Horizontal force acting on the arrester housing multiplied by the vertical distance between the mounting base (lower level of the flange) of the arrester housing and the point of application of the force.

2.62 Terminal line force

Force perpendicular to the longitudinal axis of the arrester measured at the centre line of the arrester.

2.63 Torsional loading

Each horizontal force at the top of a vertical mounted arrester housing which is not applied to the longitudinal axis of the arrester.

2.64 Breaking load

Force perpendicular to the longitudinal axis of a porcelain housed arrester leading to mechanical failure of the arrester housing.

2.65 Damage limit

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

2.66 Maximum permissible service load (MPSL)

Greatest force perpendicular to the longitudinal axis of a polymer housed arrester, allowed to be applied during service without causing any mechanical damage to the arrester.

2.67 Maximum permissible dynamic service load (MPDSL)

Greatest force perpendicular to the longitudinal axis of a porcelain housed arrester, allowed to be applied during service for short periods (e.g. short-circuit current forces, seismic stress) without causing any mechanical damage to the arrester.

2.68 Permissible static service load (PSSL)

Force perpendicular to the longitudinal axis of a porcelain housed arrester, allowed to be continuously applied during service without causing any mechanical damage to the arrester.

2.69 Internal parts

Metal-oxide resistor elements with supporting structure.

2.70 Seal (gas/water-tightness)

Ability of an arrester to avoid ingress of matter affecting the electrical and/or mechanical behaviour into the arrester.

[SIST EN 60099-4:1998/A2:2003](https://standards.iteh.ai/catalog/standards/sist/1619c4e8-ce73-46ef-a0f3-706f1ddc415a/sist-en-60099-4-1998-a2-2003)

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3.1 Arrester Identification

Replace the fifth dashed item (pressure relief rated current) by the following:

- rated short-circuit withstand current in kiloamperes (kA). For arresters for which no short-circuit rating is claimed, the sign "–" shall be indicated

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Table 1 – Arrester classification and test requirements¹⁾

Add, to table 1, the following new items 10 and 11:

	Standard nominal discharge current ²⁾				
	20 000 A	10 000 A	5 000 A	2 500 A	1 500 A
10. Internal partial discharge test	7.8	7.8	7.8	7.8	---
11. Mechanical tests	13	13	13	13	13

Replace footnote 1 by the following:

¹⁾ Numbers in rows 2 to 9, 10 and 11 refer to clauses and subclauses and annexes in this standard.