

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Railway applications – DC surge arresters and voltage limiting devices –
Part 1: Metal-oxide surge arresters without gaps**

**Applications ferroviaires – Parafoudres et appareils limiteurs de tension pour
réseaux à courant continu –
Partie 1: Parafoudres à oxyde métallique sans éclateur**



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2016 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms, containing 20 000 terms and definitions in English and French, with equivalent terms in 15 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Catalogue IEC - webstore.iec.ch/catalogue

Application autonome pour consulter tous les renseignements bibliographiques sur les Normes internationales, Spécifications techniques, Rapports techniques et autres documents de l'IEC. Disponible pour PC, Mac OS, tablettes Android et iPad.

Recherche de publications IEC - www.iec.ch/searchpub

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études,...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et aussi une fois par mois par email.

Electropedia - www.electropedia.org

Le premier dictionnaire en ligne de termes électroniques et électriques. Il contient 20 000 termes et définitions en anglais et en français, ainsi que les termes équivalents dans 15 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

Glossaire IEC - std.iec.ch/glossary

65 000 entrées terminologiques électrotechniques, en anglais et en français, extraites des articles Termes et Définitions des publications IEC parues depuis 2002. Plus certaines entrées antérieures extraites des publications des CE 37, 77, 86 et CISPR de l'IEC.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: csc@iec.ch.



IEC 62848-1

Edition 1.0 2016-06

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Railway applications – DC surge arresters and voltage limiting devices –
Part 1: Metal-oxide surge arresters without gaps**

**Applications ferroviaires – Parafoudres et appareils limiteurs de tension pour
réseaux à courant continu –
Partie 1: Parafoudres à oxyde métallique sans éclateur**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 45.060

ISBN 978-2-8322-3452-5

**Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.**

CONTENTS

FOREWORD.....	5
1 Scope.....	7
2 Normative references.....	7
3 Terms and definitions	8
4 Characteristics	14
4.1 Marking.....	14
4.2 Service conditions	14
4.2.1 Normal service conditions	14
4.2.2 Abnormal service conditions	15
4.3 Requirements.....	15
4.3.1 Insulation withstand of the arrester housing	15
4.3.2 Reference voltage	15
4.3.3 Residual voltages.....	16
4.3.4 Internal partial discharges	16
4.3.5 Seal leakage	16
4.3.6 Current distribution in a multi-column arrester	16
4.3.7 Charge transfer	16
4.3.8 Operating duty	16
4.3.9 Short circuit behaviour	16
4.3.10 Protective characteristics of the arresters	16
5 Arrester classification	16
6 Type test	17
6.1 General.....	17
6.2 Insulation withstand tests on the arrester housing	18
6.2.1 General	18
6.2.2 Ambient air conditions during tests	19
6.2.3 Wet test procedure.....	19
6.2.4 Lightning impulse voltage test	19
6.2.5 DC voltage withstand test.....	19
6.3 Residual voltage tests	19
6.3.1 General	19
6.3.2 Steep current impulse residual voltage test.....	20
6.3.3 Lightning impulse residual voltage test	20
6.3.4 Switching impulse residual voltage test.....	20
6.4 Charge transfer test	21
6.4.1 General	21
6.4.2 Charge transfer test requirements	21
6.5 Operating duty tests	22
6.5.1 General	22
6.5.2 Accelerated ageing procedure	23
6.5.3 Operating duty test.....	25
6.6 Short-circuit tests	27
6.6.1 General	27
6.6.2 Preparation of the test samples	28
6.6.3 Testing of porcelain housed arresters	29
6.6.4 Testing of polymer housed arresters	31

6.6.5	Evaluation of test results	33
6.7	Internal partial discharge tests	34
6.8	Bending moment test	34
6.8.1	General	34
6.8.2	Test on porcelain and cast-resin housed arresters	34
6.8.3	Test on polymer-housed arresters with and without enclosed gas volume	35
6.8.4	Definition of mechanical loads	38
6.9	Seal leak rate test	39
6.9.1	General	39
6.9.2	Definition of seal leak rate	39
6.9.3	Sample preparation	40
6.9.4	Test procedure	40
6.9.5	Test evaluation	40
6.10	Environmental tests	40
6.10.1	Weather ageing test for polymer-housed surge arresters	40
6.10.2	Accelerated weathering test for polymer housed surge arresters and cast resin housed surge arresters	41
6.10.3	Temperature cycling test and salt mist test for porcelain and cast resin-housed arresters	42
6.11	Shock and vibration test	43
7	Routine tests and acceptance tests	43
7.1	Routine tests	43
7.2	Acceptance tests	43
Annex A (normative)	Flowchart of testing procedure of bending moment	44
Annex B (informative)	Direct lightning current impulse withstand test	45
Bibliography	47
Figure 1	– Impulse current – Rectangular	22
Figure 2	– Power losses of the metal-oxide resistor at elevated temperatures versus time	24
Figure 3	– Short-circuit test setup for porcelain-housed arresters (all leads and venting systems in the same plane)	29
Figure 4	– Short circuit test setup for polymer housed arresters (all leads and venting systems in the same plane)	32
Figure 5	– Example of a test circuit for re-applying pre-failing immediately before applying the short-circuit test current	33
Figure 6	– Thermomechanical preconditioning	36
Figure 7	– Example of the arrangement for the thermo-mechanical preconditioning and directions of the cantilever load	37
Figure 8	– Water immersion test	38
Figure 9	– Definition of mechanical loads (base load = SSL)	39
Figure 10	– Surge arrester unit	39
Figure A.1	– Flowchart of testing procedure of bending moment	44
Table 1	– Arrester classification	17
Table 2	– Nominal discharge current	17
Table 3	– Type tests	18
Table 4	– Peak currents for switching impulse residual voltage test	21

Table 5 – Parameters for the charge transfer test	21
Table 6 – Determination of elevated continuous operating voltage	25
Table 7 – Test procedure of operating duty test	25
Table 8 – Values for high current impulses	26
Table 9 – Required currents for short-circuit tests of porcelain housed arresters	30
Table 10 – Required currents for short-circuit tests	32
Table B.1 – Parameters for the direct lightning impulse	45

iTeh STANDARD PREVIEW (standards.iteh.ai)

IEC 62848-1:2016

<https://standards.iteh.ai/catalog/standards/sist/5f8e2372-d07e-4e84-98f5-a9b823566c3b/iec-62848-1-2016>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

RAILWAY APPLICATIONS – DC SURGE ARRESTERS AND VOLTAGE LIMITING DEVICES –

Part 1: Metal-oxide surge arresters without gaps

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 62848-1 has been prepared by IEC technical committee 9: Electrical equipment and systems for railways.

This International Standard is based on EN 50526-1:2012, the main technical changes with regard to EN 50526-1:2012 are as follows:

- a) According to Resolution 52/33, taken by IEC technical committee 9, this international standard should apply to both fixed installations and rolling stock, therefore the title is replaced with “Railway applications – DC surge arresters and voltage limiting devices – Part 1: Metal-oxide surge arresters without gaps”, and the scope of IEC 62848-1 is modified so that the standard can be used in both cases.
- b) As rolling stocks are supplied with many voltages as stated in IEC 60850, the surge arrester will limit voltage surge on DC systems specified in IEC 60850 with nominal voltage up to 3 kV.
- c) The European standards, listed in the original EN 50526-1:2012, are replaced with international standards, if they have corresponding international standards, as follows:

- 1) EN 50124-1:2001 → IEC 62497-1:2010;
 - 2) EN 50125-2:2002 → IEC 62498-2:2010;
 - 3) EN 60060-1:2010 → IEC 60060-1:2010;
 - 4) EN 60270:2001 → IEC 60270:2000;
 - 5) EN 61109:2008 → IEC 61109:2008;
 - 6) EN ISO 4287:1998 → ISO 4287:1997;
 - 7) EN ISO 4892-1:2000 → ISO 4892-1:1999;
 - 8) EN ISO 4892-2:2006 → ISO 4892-2:2006;
 - 9) EN ISO 4892-3:2006 → ISO 4892-3:2006.
- d) As this international standard will be used for both rolling stock and fixed installation, the following international standards relating to rolling stock are added:
- 1) IEC 62498 (all parts), *Railway applications – Environmental conditions for equipment*;
 - 2) IEC 61373, *Railway applications- Rolling stock equipment- Shock and vibration tests*.

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

FDIS	Report on voting
9/2155/FDIS	9/2177/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.

A list of all parts in the IEC 62848 series, published under the general title *Railway applications – DC surge arresters and voltage limiting devices*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC website 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.

RAILWAY APPLICATIONS – DC SURGE ARRESTERS AND VOLTAGE LIMITING DEVICES –

Part 1: Metal-oxide surge arresters without gaps

1 Scope

This part of IEC 62848 applies to non-linear metal-oxide surge arresters without gaps for both on board and fixed installations, designed to limit voltage surges on DC systems specified in IEC 60850 with nominal voltage up to 3 kV.

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 60060-1:2010, *High-voltage test techniques – Part 1: General definitions and test requirements*

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 60270:2000, *High-voltage test techniques – Partial discharge measurements*

IEC 61109:2008, *Insulators for overhead lines – Composite suspension and tension insulators for a.c. systems with a nominal voltage greater than 1 000 V – Definitions, test methods and acceptance criteria*

IEC 61373, *Railway applications- Rolling stock equipment – Shock and vibration tests*

IEC 62497-1:2010, *Railway applications – Insulation coordination – Part 1: Basic requirements – Clearances and creepage distances for all electrical and electronic equipment*

IEC 62498 (all parts), *Railway applications – Environmental conditions for equipment*

IEC 62498-1:2010, *Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock*

IEC 62498-2:2010, *Railway applications – Environmental conditions for equipment – Part 2: Fixed electrical installations*

ISO 4287:1997, *Geometrical Product Specifications (GPS) – Surface texture: Profile method - Terms, definitions and surface texture parameters*

ISO 4892-1:1999, *Plastics – Methods of exposure to laboratory light sources – Part 1: General guidance*

ISO 4892-2:2013, *Plastics – Methods of exposure to laboratory light sources – Part 2: Xenon-arc lamps*

ISO 4892-3:2016, *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.

3.1

nominal voltage

U_n
designated value for a system

[SOURCE: IEC 60850:2007, 3.3]

3.2

highest permanent voltage

U_{max1}
maximum value of the voltage likely to be present indefinitely

[SOURCE: IEC 60850:2007, 3.4]

3.3

highest non-permanent voltage

U_{max2}
maximum value of the voltage likely to be present for a limited period of time

[SOURCE: IEC 60850:2007, 3.5]

3.4

rated insulation voltage

U_{Nm}
DC withstand voltage value assigned by the manufacturer to the equipment or a part of it, characterising the specified permanent (over 5 min) withstand capability of its insulation

[SOURCE: IEC 62497-1:2010, 3.4.4, modified – the rated insulation voltage is a DC withstand voltage value for DC surge arrester and Note 1 to Note 4 have been deleted]

3.5

rated impulse withstand voltage

U_{Ni}
impulse voltage value assigned by the manufacturer to the equipment or a part of it, characterising the specified withstand capability of its insulation against transient overvoltages

[SOURCE: IEC 62497-1:2010, 3.4.7, modified – Note has been deleted.]

3.6

overvoltage

voltage having a peak value exceeding the corresponding peak value of the highest non-permanent voltage U_{max2}

3.7**transient overvoltage**

short duration overvoltage of a few milliseconds (up to 20 ms) or less associated with a transient regime. Two particular transient overvoltages are defined: switching overvoltage and lightning overvoltage

[SOURCE: IEC 62497-1:2010, 3.5.2, modified – Note has been deleted.]

3.8**switching overvoltage**

transient overvoltage at any point of the system due to specific switching operation or fault

[SOURCE: IEC 62497-1:2010, 3.5.3]

3.9**lightning overvoltage**

transient overvoltage at any point of the system due to a lightning discharge

[SOURCE: IEC 62497-1:2010, 3.5.4]

3.10**surge arrester**

device intended to limit the transient overvoltages to a specified level

3.11**metal-oxide surge arrester**

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

3.12**continuous operating voltage of an arrester**

U_c

designated permissible DC voltage value that may be applied continuously between the arrester terminals

[SOURCE: IEC 60099-4:2009, 3.9, modified – the definition has been adapted for DC surge arrester instead of AC surge arrester.]

3.13**rated voltage of an arrester**

U_r

voltage by which the arrester is designated

Note 1 to entry: Because of the particular nature of the DC electrical installation dealt with, the rated voltage of a DC arrester coincides with the continuous operating voltage.

3.14**elevated continuous operating voltage**

U_c^*

test voltage U_c^* that, when applied to new metal-oxide resistor, gives the same power losses as the voltage U_c when applied to aged metal-oxide resistors

3.15**lightning impulse protection level**

U_{pl}

maximum residual voltage for the nominal discharge current

3.16

switching impulse protection level

U_{ps}

maximum residual voltage at the specified switching impulse current

3.17

charge transfer capability

Q_t

maximum charge per impulse that can be transferred during the charge transfer test and during the operating duty test

3.18

discharge current of an arrester

impulse current which flows through the arrester

3.19

nominal discharge current of an arrester

I_n

peak value of lightning current impulse which is used to classify an arrester

[SOURCE: IEC 60099-4:2009, 3.30]

3.20

high current impulse of an arrester

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

[SOURCE: IEC 60099-4:2009, 3.31]

[IEC 62848-1:2016](https://standards.iteh.ai/catalog/standards/sist/5f8e2372-d07e-4e84-98f5-a9b823566c3b/iec-62848-1-2016)

3.21

steep current impulse

current impulse with a virtual front time of 1 μs with limits in the adjustment of equipment such that the measured values are from 0,9 μs to 1,1 μs and the virtual time to half-value on the tail is not longer than 20 μs

[SOURCE: IEC 60099-4:2009, 3.16, modified – Note has been deleted.]

3.22

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 on the tail

[SOURCE: IEC 60099-4:2009, 3.17]

3.23

direct lightning current impulse

impulse defined by the charge Q and the peak value of the current impulse I_{imp}

3.24

switching current impulse of an arrester

I_{sw}

peak value of discharge current having a virtual front time greater than 30 μs but less than 100 μs and a virtual time to half value on the tail of roughly twice the virtual front time

[SOURCE: IEC 60099-4:2009, 3.32]

3.25**reference current of an arrester** I_{ref}

DC current defined by the manufacturer used to determine the reference voltage of the arrester

Note 1 to entry: The reference current will be typically in the range of 0,01 mA to 0,5 mA per square centimetre of disc area for single column arrester.

3.26**reference voltage of an arrester** U_{ref}

DC voltage which is applied to the arrester to obtain the reference current

Note 1 to entry: For asymmetrical U/I characteristics, the lower value of the two voltages shall be used to determine the reference voltage.

[SOURCE: IEC 60099-9:2014, 3.49, modified – Note 1 has been adapted and Note 2 deleted.]

3.27**residual voltage of an arrester** U_{res}

peak value of voltage that appears between the terminals of an arrester during the passage of discharge current

[SOURCE: IEC 60099-4:2009, 3.36]

3.28**rated short circuit current of an arrester** I_s

maximum current that may flow in case of an arrester failure for a specified time

3.29**shed**

insulating part projecting from the housing, intended to increase the creepage distance

[SOURCE: IEC 60099-4:2009, 3.46.2]

3.30**porcelain-housed arrester**

arrester using porcelain as housing material, with fittings and sealing systems

[SOURCE: IEC 60099-4:2009, 3.59]

3.31**polymer-housed arrester**

arrester using polymeric and/or composite materials for housing

[SOURCE: IEC 60099-4:2009, 3.60, modified – this definition has been adapted and Note has been deleted.]

3.32**cast-resin housed arrester**

arrester using a housing made from organic hard material that fractures similarly to a porcelain housing under mechanical overstress

3.33

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

[SOURCE: IEC 60099-4:2009, 3.61]

3.34

torsional loading

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

[SOURCE: IEC 60099-4:2009, 3.63, modified – “each” deleted]

3.35

breaking load

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

[SOURCE: IEC 60099-4:2009, 3.64]

3.36

mean breaking load

MBL

average breaking load for porcelain arresters determined from tests

Note 1 to entry: Adapted from IEC 60099-4:2009, Clause A.2.

3.37

specified long-term load

SLL

force perpendicular to the longitudinal axis of an arrester, allowed to be continuously applied during service without causing any mechanical damage to the arrester

[SOURCE: IEC 60099-4:2009, 3.66]

3.38

specified short-term load

SSL

greatest force perpendicular to the longitudinal axis of an arrester, allowed to be applied during service for short periods and for relatively rare events (for example, short-circuit current loads, extreme wind gusts) without causing any mechanical damage to the arrester

[SOURCE: IEC 60099-4: 2009, 3.67]

3.39

non-linear metal-oxide resistor

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

[SOURCE: IEC 60099-4:2009, 3.2]

3.40

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

[SOURCE: IEC 60099-4:2009, 3.7]

3.41

internal parts

metal-oxide resistor element with supporting structure

[SOURCE: IEC 60099-4:2009, 3.69]

3.42

seal

gas/water tightness

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

[SOURCE: IEC 60099-4:2009, 3.70]

3.43

disruptive discharge

phenomena associated with the failure of insulation under electric stress, which include 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.

[SOURCE: IEC 60099-4:2009, 3.11, modified]

3.44

puncture

breakdown

disruptive discharge through a solid

[IEC 62848-1:2016](http://standards.iteh.ai/catalog/standards/sist/5f8e2372-d07e-4e84-98f5-a9b823566c3b/iec-62848-1-2016)

<http://standards.iteh.ai/catalog/standards/sist/5f8e2372-d07e-4e84-98f5-a9b823566c3b/iec-62848-1-2016>

[SOURCE: IEC 60099-4:2009, 3.12]

3.45

flashover

disruptive discharge over a solid surface

[SOURCE: IEC 60099-4:2009, 3.13]

3.46

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

Note 1 to entry: The parameters which define a voltage or current impulse are polarity, peak value, front time and time to half value on the tail.

[SOURCE: IEC 60099-4:2009, 3.14]

3.47

type test

design test

conformity test made on one or more items representative of the production

[SOURCE: IEC 60050-151:2001, 151-16-16]