Nizkonapetostne naprave za zaščito pred prenapetostnimi udari - 1. del: Naprave za zaščito pred prenapetostnimi udari za nizkonapetostne razdelilne sisteme - Zahteve in preskusi

Low-voltage surge protective devices - Part 1: Surge protective devices connected to low-voltage power distribution systems - Requirements and tests

Parafoudres basse tension - Partie 1: Parafoudres connectés aux réseaux de distribution basse tension - Exigences et essais

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ICS:
29.120.50 Varovalke in druga medtokovna zaščita
29.240.10 Transformatorske postaje, Prenapetostni odvodniki

Fuses and other overcurrent protection devices
Substations. Surge arresters

SIST IEC 61643-1:2010 en

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Parafoudres basse tension –
Partie 1:
Parafoudres connectés aux réseaux de distribution basse tension – Exigences et essais

Low-voltage surge protective devices –
Part 1:
Surge protective devices connected to low-voltage power distribution systems – Requirements and tests
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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.

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International Standard IEC 61643-1 has been prepared by subcommittee 37A: Low-voltage surge protective devices, of IEC technical committee 37: Surge arresters.

This second edition of IEC 61643-1 cancels and replaces the first edition of IEC 61643-1, published 1998, Amendment 1 (2001) and corrigendum 1 (2003). This edition incorporates Amendment 2 which was not published separately due to the number of changes and pages.

The document 37A/169/FDIS, circulated to the National Committees as amendment 2, led to the publication of this standard.
The text of this standard is based on the first edition of IEC 61643-1, its Amendment 1, its corrigendum 1 and on the following documents:

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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 IEC TC 37, SC 37A and SC 37B have adopted a new numbering scheme for all IEC publications developed within these committees.

In this scheme, the IEC 61643 series of publications covers all the publications from SC 37A and SC 37B according to the table below with the common general title *Low-voltage surge protective devices*.

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IEC 61643-323  Low-voltage surge protective devices – Components for surge protective devices – Part 323: Selection and applications principles for avalanche breakdown diodes (ABDs)

IEC 61643-331  Low-voltage surge protective devices – Components for surge protective devices – Part 331: Test specification for metal oxide varistors (MOVs)  IEC 61643-331

IEC 61643-332  Low-voltage surge protective devices – Components for surge protective devices – Part 332: Performance specification for metal oxide varistors (MOVs)

IEC 61643-333  Low-voltage surge protective devices – Components for surge protective devices – Part 333: Selection and application principles for metal oxide varistors (MOVs)

IEC 61643-341  Low-voltage surge protective devices – Components for surge protective devices – Part 341: Test specification for thyristor surge suppressors (TSSs)  IEC 61643-341

IEC 61643-342  Low-voltage surge protective devices – Components for surge protective devices – Part 342: Performance specification for thyristor surge suppressors (TSSs)

IEC 61643-343  Low-voltage surge protective devices – Components for surge protective devices – Part 343: Selection and application principles for thyristor surge suppressors (TSSs)

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.
INTRODUCTION

The present standard addresses performance tests for surge protective devices (SPDs).

There are three classifications of tests.

The class I test is intended to simulate partial conducted lightning current impulses. SPDs subjected to class I test methods are generally recommended for locations at points of high exposure, e.g., line entrances to buildings protected by lightning protection systems.

SPDs tested to class II or III test methods are subjected to impulses of shorter duration. These SPDs are generally recommended for locations with lesser exposure.

All SPDs are tested on a "black box" basis. Tests are included to assess techniques used by the manufacturers in order to apply the most appropriate test method.

Part 12 addresses the selection and application principles of SPDs in practical situations.
1 General

1.1 Scope

This part of IEC 61643 is applicable to devices for surge protection against indirect and direct effects of lightning or other transient overvoltages. These devices are packaged to be connected to 50/60 Hz a.c. and d.c. power circuits, and equipment rated up to 1 000 V r.m.s. or 1 500 V d.c. Performance characteristics, standard methods for testing, and ratings are established for these devices that contain at least one nonlinear component that is intended to limit surge voltages and divert surge currents.

1.2 Normative references

The following referenced documents are indispensable for the application 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 60060-1:1989, High-voltage test techniques – Part 1: General definitions and test requirements

IEC 60112:2003, Method for determining the comparative and the proof tracking indices of solid insulating materials under moist conditions

IEC 60227 (all parts), Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V

IEC 60245 (all parts), Rubber insulated cables – Rated voltages up to and including 450/750 V


IEC 60529:1989, Degrees of protection provided by enclosures (IP code)

IEC 60664-1:1992, Insulation coordination for equipment within low-voltage systems – Part 1: Principles, requirements and tests


IEC 60884-1:2002, Plugs and socket outlets for household and similar purposes – Part 1: General requirements

IEC 60947-1:1996, Low voltage switchgear and controlgear – Part 1: General rules
2 Service conditions

2.1 Normal

2.1.1 Frequency: frequency of the supply mains is between 48 Hz and 62 Hz a.c.

2.1.2 Voltage: the voltage applied continuously between the terminals of the Surge Protective Device (SPD) must not exceed its maximum continuous operating voltage.

2.1.3 Altitude: altitude shall not exceed 2 000 m.

2.1.4 Operating and storage temperatures

- normal range: −5 °C to +40 °C
- extended range: −40 °C to +70 °C

2.1.5 Humidity – relative humidity: under indoor temperature conditions shall be between 30 % and 90 %.

2.2 Abnormal

Exposure of the SPD to abnormal service conditions may require special consideration in the design or application of the SPD, and should be called to the attention of the manufacturer.

For outdoor SPDs exposed to solar or other radiation, additional requirements may be necessary.

3 Definitions

For the purpose of this part of IEC 61643, the following definitions apply.

3.1 Surge Protective Device SPD

device that is intended to limit transient overvoltages and divert surge currents. It contains at least one nonlinear component

3.2 one-port SPD

SPD connected in shunt with the circuit to be protected. A one port device may have separate input and output terminals without a specific series impedance between these terminals
3.3 two-port SPD
SPD with two sets of terminals, input and output. A specific series impedance is inserted between these terminals.

3.4 voltage switching type SPD
SPD that has a high impedance when no surge is present, but can have a sudden change in impedance to a low value in response to a voltage surge. Common examples of components used as voltage switching devices are spark gaps, gas tubes, thyristors (silicon-controlled rectifiers) and triacs. These SPDs are sometimes called "crowbar type".

3.5 voltage limiting type SPD
SPD that has a high impedance when no surge is present, but will reduce it continuously with increased surge current and voltage. Common examples of components used as non-linear devices are varistors and suppressor diodes. These SPDs are sometimes called "clamping type".

3.6 combination type SPD
SPD that incorporates both voltage switching type components and voltage limiting type components may exhibit voltage switching, voltage limiting or both voltage switching and voltage limiting behaviour depending upon the characteristics of the applied voltage.

3.7 modes of protection
SPDs protective component may be connected line-to-line or line-to-earth or line-to-neutral or neutral-to-earth and combinations thereof. These paths are referred to as modes of protection.

3.8 nominal discharge current
$I_n$ crest value of the current through the SPD having a current waveshape of 8/20. This is used for the classification of the SPD for class II test and also for preconditioning of the SPD for class I and II tests.

3.9 impulse current
$I_{imp}$
defined by three parameters, a current peak value $I_{peak}$, a charge $Q$ and a specific energy $W/R$.

Note: This is used for the classification of the SPD for test class I.

3.10 maximum discharge current $I_{max}$ for class II test
crest value of a current through the SPD having an 8/20 waveshape and magnitude according to the test sequence of the class II operating duty test. $I_{max}$ is greater than $I_n$.

3.11 maximum continuous operating voltage
$U_c$
maximum r.m.s. or d.c. voltage, which may be continuously applied to the SPD’s mode of protection.