TECHNICAL SPECIFICATION

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CLC/TS 61643-22

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Supersedes CLC/TS 61643-22:2006

English Version

Low-voltage surge protective devices - Part 22: Surge protective devices connected to telecommunications and signalling networks - Selection and application principles (IEC 61643-22:2015 , modified)

Parafoudres basse tension - Partie 22: Parafoudres connectés aux réseaux de signaux et de télécommunications - Principes de choix et d'application (IEC 61643-22:2015 , modifiée)

Überspannungsschutzgeräte für Niederspannung - Teil 22: Überspannungsschutzgeräte für den Einsatz in Telekommunikations- und signalverarbeitenden Netzwerken - Auswahl und Anwendungsprinzipien (IEC 61643-22:2015 , modifiziert)

This Technical Specification was approved by CENELEC on 2016-02-29.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (CLC/TS 61643-22:2016) consists of the text of IEC 61643-22:2015 prepared by SC 37A "Low-voltage surge protective devices" of IEC/TC 37 "Surge arresters", together with the common modifications prepared by CLC/TC 37A "Low voltage surge protective devices".

This document supersedes CLC/TS 61643-22:2006.

CLCTS 61643-22:2016 includes the following significant technical changes with respect to CLC/TS 61643-22:2006:

a) Update the use of multiservice SPDs (Article 8)

b) Comparison between SPD classification of EN 61643-11 and EN 61643-21 (7.3.3)

c) Consideration of new transmission systems as PoE (Annex F)

d) EMC requirements of SPDs (Annex G)

e) Maintenance cycles of SPDs (Annex I)

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

Endorsement notice

The text of the International Standard IEC 61643-22:2015 was approved by CENELEC as a European Standard with agreed common modifications.

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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.

EN 61643-21:2001 + A1:2009 +A2:2013, *Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signalling networks – Performance requirements and testing methods* (IEC 61643-21:2000 + A1:2008, modified +A2:2012)

EN 61643-11, *Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods* (IEC 61643-11)

EN 61643-12, *Low-voltage surge protective devices – Part 12: Surge protective devices connected to low-voltage power distribution systems – Selection and application principles* (IEC 61643-12)

EN 62305-1:2011, *Protection against lightning – Part 1: General principles* (IEC 62305-1:2010, modified)

EN 62305-2:2012, *Protection against lightning – Part 2: Risk management* (IEC 62305-2:2010, modified)

EN 62305-3:2011 *Protection against lightning – Part 3: Physical damage to structures and life hazard* (IEC 62305-3:2010, modified)

EN 62305-4:2011 *Protection against lightning – Part 4: Electrical and electronic systems within structures* (IEC 62305-4:2010, modified)

EN 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test* (IEC 61000-4-5)

7.2 Coupling mechanisms

Replace *Table 2 by the following:*

Table 2 – Coupling mechanisms

Source of transients	Direct lightning to the structure (S1)		Lightning to ground near the structure (S2)	Direct lightning to the line (S3)	Lightning to ground near the line (S4)	AC influence
Coupling	Resistive (1)	Induction (2)	Induction[a] (2)	Resistive (1, 5)	Induction (3)	Resistive (4)
Voltage wave-shape (μs)	–	1,2/50	1,2/50	–	10/700	50 Hz
Current wave-shape (μs)	10/350	8/20	8/20	10/350[c]	5/320	–
Preferred category[b]	D1	C2	C2	D1	B2	A2

NOTE (1) – (5) see Figure 3, coupling mechanisms.

[a] Also applies for capacitive/inductive couplings of switching in adjoining power supply networks.

[b] See Table 3 of EN 61643-21:2001 + A1:2009 + A2:2013.

[c] The simulated direct lightning strike test impulse is described by the IEC as a peak current value and total charge. A typical waveshape that can achieve these parameters is a double exponential impulse, 10/350 being used in this example.

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7.3.1.3 Selection of SPDs to reduce transients

Replace *Table 3 by the following:*

Table 3 – Selection aid for rating SPDs for the use in (zone) interfaces according to EN 62305-1

Lightning protection zone EN 62305-1		LPZ 0/1	LPZ 1/2	LPZ 2/3
Requirements to SPDs (Category from Table 3, EN 61643-21)	SPD (j)*	D1 B2	---	---
	SPD (k)*	---	C2/B2	---
	SPD (l)*	---	---	C1
* SPD (j, k, l), see Figure 4. NOTE The range of surge values indicated under LPZ 2/3 includes typical minimum resistibility requirements and might be implemented into the equipment by market.				

Annex B (informative) Current limiting components

B.2.3.2 Heat coils

Replace *contents under B.2.3.2 as follows:*

Heat coils are thermally activated mechanical components with normally a series and shunt connection on the line being protected. Their function is to divert current at the circuit connection point, thereby preventing this current from flowing through the protected equipment, as shown in Figure B.3. Normally they are constructed using a grounding contact held in its non-operative position by solder. A heat source, generally a coil of resistance wire and a spring, force the grounding contact to ground when the solder melts.

The source of heat is the unwanted line current flowing through the coil of resistance wire. The resistance of communication-type heat coils is typically 4,0 Ω, with a range between 0,4 Ω and 21 Ω. The contact arrangement is such that once the heat coil contacts are closed (operated) the current flows to earth directly and bypasses the coils.

Heat coils are normally single-operating component. There is no means to restore the line to its operating state other than the replacement of the item containing the heat coil. Heat coils have been designed that are manually resettable, not requiring replacement of the SPD. Their use is generally restricted for application in areas where induced currents from 50 Hz power systems are frequent.

It is also possible to construct current-interrupting heat coils, which open circuit as a result of overcurrent.

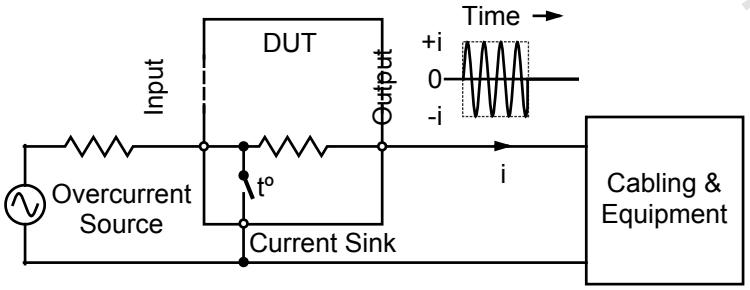

Figure B.3 – Thermally operated (heat coil) three-terminal shunt current limiter

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Annex J (informative) Earth potential rise (EPR)

J.2 Causes of EPR

Replace *text under J.2 as follows:*

Power related EPR is caused by a low frequency, 50 Hz fault current flowing through a ground grid or the earth via a distribution line power cross to a tree or other earthing paths or utility switching of power lines. The duration of this event may last from fractions of a second to many minutes.

Lightning related EPR is caused by a fast rising current of many kA with rise times in nano seconds to micro seconds and pulse widths in micro seconds to milli seconds flowing through a ground grid or the earth.

Electrified railways also cause EPR.

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INTRODUCTION

This International Standard is a guide for the application of SPDs to telecommunications and signalling lines and those SPDs which have telecom or signalling SPDs in the same enclosure with power line SPDs (so called multiservice SPDs). Definitions, requirements and test methods are given in IEC 61643-21. The decision to use SPDs is based on an analysis of the risks that are seen by the network or system under consideration. Because telecommunications and signalling systems may depend on long lengths of wire, either buried or aerial, the exposure to overvoltages from lightning, power line faults and power line/load switching, can be significant. If these lines are unprotected, the resultant risk to information technology equipment (ITE) can also be significant. Other factors that may influence the decision to use SPDs are local regulators and insurance stipulations. This standard provides indications for evaluating the need for SPDs, the selection, installation and dimensioning of SPDs and for achieving coordination between SPDs and between SPDs and ITE installed on telecommunication and signal lines.

Coordination of SPDs assures that a proper interaction between them, as well as between an SPD and the ITE to be protected will be realized. Coordination requires that the voltage protection level, U_p, and let-through current, I_p, of the initial SPD does not exceed the resistibility of subsequent SPDs or the ITE.

In general, the SPD closest to the source of the impinging surge diverts most of the surge: a downstream SPD will divert the remaining or residual surge. The coordination of SPDs in a system is affected by the operation of the SPDs and the equipment to be protected as well as the characteristics of the system to which the SPDs are connected.

The following variables should be reviewed when attempting to attain proper coordination:

- waveshape of the impinging surge (impulse or AC);
- ability of the equipment to withstand an overvoltage/overcurrent without damage;
- installation, e.g. distance between SPDs and between SPDs and ITE;
- SPD voltage-protection levels.

The performance of an SPD and its coordination with other SPDs can be affected by exposure to previous transients. This is especially true for transients which approach the limit of the capacity of the SPD. If there is considerable doubt concerning the number and severity of the surges handled by the SPDs under consideration, it is suggested that SPDs with higher capabilities be used.

One of the direct effects of poor coordination may be bypassing of the SPD closest to the surge source, with the result that the following SPD will be forced to handle the entire surge. This can result in damage to that SPD.

Lack of proper coordination can also lead to equipment damage and, in severe cases, may lead to a fire hazard.

There are several technologies used in the design of the SPDs covered in this standard. These are explained in the main text and also in informative Annexes A and B.

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LOW-VOLTAGE SURGE PROTECTIVE DEVICES –

Part 22: Surge protective devices connected to telecommunications and signalling networks – Selection and application principles

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1 Scope

This part of IEC 61643 describes the principles for the selection, operation, location and coordination of SPDs connected to telecommunication and signalling networks with nominal system voltages up to 1 000 V r.m.s. a.c. and 1 500 V d.c.

This standard also addresses SPDs that incorporate protection for signalling lines and power lines in the same enclosure (so called multiservice SPDs).

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 61643-21:2012, *Low voltage surge protective devices – Part 21: Surge protective devices connected to telecommunications and signalling networks – Performance requirements and testing methods*

IEC 61643-11, *Low-voltage surge protective devices – Part 11: Surge protective devices connected to low-voltage power systems – Requirements and test methods*

IEC 61643-12, *Low-voltage surge protective devices – Part 12: Surge protective devices connected to low-voltage power distribution systems – Selection and application principles*

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IEC 62305-4:2010, *Protection against lightning – Part 4: Electrical and electronic systems within structures*

IEC 61000-4-5, *Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test*

3 Terms, definitions and abbreviations

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