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Interested committees:

Title: BS EN IEC 61643-21 Low voltage surge protective devices

Part 21: Surge protective devices connected to telecommunications and signalling networks - Requirements and testing methods

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

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Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



37A/399/CD

COMMITTEE DRAFT (CD)

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DATE OF CIRCULATION: 2023-08-11	CLOSING DATE FOR COMMENTS: 2023-10-06
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IEC SC 37A : LOW-VOLTAGE SURGE PROTECTIVE DEVICES	
SECRETARIAT: United States of America	SECRETARY: Mr Casey Granata
OF INTEREST TO THE FOLLOWING COMMITTEES: TC 37	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CD to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☐ QUALITY ASSURANCE ☒ SAFETY	

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TITLE:

Low voltage surge protective devices - Part 21: Surge protective devices connected to telecommunications and signalling networks - Requirements and testing methods

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SURGE PROTECTIVE DEVICES –**Part 21: Surge protective devices connected to telecommunications
and signalling networks –
Requirements and test methods****FOREWORD**

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International Standard IEC 61643-21 has been prepared by subcommittee 37A: Low-voltage surge protective devices, of IEC technical committee 37: Surge arresters.

This second edition cancels and replaces the first edition including the amendments published in 2000, 2008 and 2012. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) New structure of IEC 61643-21 based on IEC 61643-01 Ed.1

b) *To be completed at CDV stage*

The text of this International Standard is based on the following documents:

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

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

The National Committees are requested to note that for this document the stability date is

THIS TEXT IS INCLUDED FOR THE INFORMATION OF THE NATIONAL COMMITTEES AND WILL BE DELETED AT THE PUBLICATION STAGE.

INTRODUCTION

It has been assumed in the drafting of this International Standard that the execution of its provisions is entrusted to appropriately qualified and experienced persons.

This standard recognizes the internationally accepted level of protection against hazards such as electrical, mechanical, thermal, fire and radiation of SPDs when operated as in normal use taking into account the manufacturer's instructions

The purpose of this International Standard is to identify the requirements for Surge Protective Devices (SPDs) used in protecting telecommunication and signalling systems, for example, low-voltage data, voice, and alarm circuits. All of these systems may be exposed to the effects of lightning and power line faults, either through direct contact or induction. These effects may subject the system to transient overvoltages or overcurrents or both, whose levels are sufficiently high to harm the system. SPDs are intended to provide protection against overvoltages and overcurrents caused by lightning and power line faults.

This part of the IEC 61643 series addresses safety and performance tests for surge protective devices (SPDs) for telecommunication and signalling systems in conjunction with part 01.

The SPDs addressed in this International Standard may contain surge protective components only, or a combination of surge protective and current-limiting components. Protection devices containing current-limiting components only are not within the coverage of this standard. However, devices with only current-limiting components are shown in Annexe B.

An SPD may comprise several protective components. All SPDs are tested on a "black box" basis, i.e., the number of connections of the SPD determine the testing procedure, not the number of components in the SPD. The SPD configurations are described in 4.100.

This standard covers a wide range of testing conditions and requirements; the use of some of these is at the discretion of the user. How the requirements of this standard relate to the different types of SPD is described in Table 1. Selection and application principles are covered in IEC 61643-22.

If the intended applications of an SPD are covered by different parts of the IEC 61643 series, all relevant parts are applied, as far as reasonable.

NOTE: Throughout this publication, when "part 01" is mentioned, it refers to IEC 61643-01.

SPDs containing additional features or functions not addressed in this standard may require additional consideration and tests to ensure the main SPD function is not adversely affected and no hazards may arise from these additional features or functions. If appropriate standards exist to cover such functions they should be applied.

The requirements of this part of IEC 61643 supplement, modify or replace certain of the general requirements contained in part 01 and are to be read and applied together with the latest edition of IEC 61643-01, as indicated by the undated normative reference in the normative references of this document.

Numbering of clauses follows the numbering of part 01, but, dependent on the application of clauses from part 01, does not necessarily follow sequentially.

If a clause in part 01 is not explicitly called up or referred to in this part 21 of the IEC 61643 series of standards, then this clause does not apply to SPDs covered by this part 21.

The numbering of additional subclauses to part 01 in this document starts with the number 100 in the last section of the subclauses added (e.g. 4.100 or 6.2.100).

LOW-VOLTAGE SURGE PROTECTIVE DEVICES –

Part 21: Surge protective devices connected to telecommunications and signalling networks – Requirements and testing methods

1 Scope

This part of the IEC 61643 series is applicable to devices for surge protection against indirect and direct effects of lightning or other transient overvoltages.

These devices are intended to be connected to telecommunications and signalling networks, and equipment rated up to 1 000 V RMS and 1 500 V DC.

These telecommunications and signalling networks may also provide power on the same line, e.g. Power over Ethernet (PoE).

Performance and safety requirements, tests and ratings are specified in this standard. These devices contain at least one voltage-limiting component (clamping or switching) and are intended to limit surge voltages and divert surge currents.

2 Normative references

For the purposes of this document normative reference given in part 01 apply.

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 61643-01:2023, *Low-voltage surge protective devices – Part 01: General requirements and test methods*

3 Terms, definitions and abbreviated terms

Clause 3 from part 01 applies with the following additions:

3.1 General

Clause 3.1 from part 01 applies.

3.2 Terms and definitions

Clause 3.2 from part 01 applies with the following additions:

3.2.25

Means for short-circuiting the SPD (SC-means)

Clause 3.2.14 from part 01 applies with the following replacement.

Replace short-circuit current rating I_{SCCR} by n times I_L

3.2.100

AC durability

characteristic of an SPD which allows it to conduct alternating current of a specific magnitude and duration for a specified number of times

3.2.101**blind spot**

situation where voltages above the maximum continuous operating voltage U_c may cause incomplete operation of the SPD

Note 1 to entry: Incomplete operation of the SPD means not all of the stages in a multi-stage SPD have operated during the impulse test. This may result in overstressing of components in the SPD.

3.2.102**current limiting**

action of an SPD, containing at least one non-linear current-limiting component, that causes currents exceeding a predetermined value to be restricted

3.2.103**current reset time**

time required for a self-resetting current limiting component to revert to its normal or quiescent state

3.2.104**current response time**

time required for a current-limiting component to operate at a specified current and a specified temperature

3.2.105**impulse durability**

characteristic of an SPD which allows it to conduct impulse current of a specified waveform and peak value for a specified number of times

3.2.106**insertion loss**

loss resulting from the insertion of an SPD into a transmission system

Note 1 to entry: It is the ratio of the power delivered to that part of the system following the SPD, before insertion of the SPD, to the power delivered to that same part after insertion of the SPD. The insertion loss is generally expressed in decibels.

[IEV 726-06-07, modified]

3.2.107**insulation resistance**

resistance between designated connections of an SPD when U_c is applied to those connections

3.2.108**longitudinal balance (analogue voice frequency circuits)**

electrical symmetry of the two wires comprising a pair with respect to ground

3.2.109**longitudinal balance (communication and control cables)**

ratio of the disturbing common mode (longitudinal) RMS voltage (V_s) to ground and the resulting differential mode (metallic) RMS voltage (V_m) of the SPD, expressed in decibels (dB)

Note 1 to entry: The longitudinal balance in dB is given by the formula: $20 \log_{10} V_s/V_m$

where V_s and V_m are measured at the same frequency.

3.2.110**longitudinal balance (data transmission)**

measure of the similarity of impedance to ground (or common) for the two or more conductors of a balanced circuit

Note 1 to entry: This term is used to express the degree of susceptibility to common mode interference

3.2.111**longitudinal balance (telecommunications)**

ratio of the disturbing common mode (longitudinal) voltage V_s and the resulting differential mode (metallic) voltage V_m of the SPD, expressed in decibels (dB)

3.2.112**maximum interrupting voltage**

maximum voltage (DC or RMS) that can be applied to the current-limiting components of an SPD without degradation of the SPD

Note 1 to entry: This voltage may be equal to the U_C of the SPD or may be a higher value depending on the arrangement of the current-limiting component(s) within the SPD

3.2.113**multi-stage SPD**

SPD which has more than one parallel branch of voltage-limiting component

Note 1 to entry: These voltage-limiting components may or may not be electrically separated by a series component. The voltage-limiting components may be either switching or clamping types

3.2.114**near-end crosstalk (NEXT)**

crosstalk that is propagated in a disturbed channel in the direction opposite to the direction of propagation of the current in the disturbing channel

Note 1 to entry: The terminal of the disturbed channel at which the near-end crosstalk is present is ordinarily near to, or coincides with, the energized terminal of the disturbing channel

3.2.115**overstressed fault mode**

mode 1 condition wherein the voltage-limiting part of the SPD has been disconnected

Note 1 to entry: The voltage-limiting function is no longer present, but the line is still operable

mode 2 condition wherein the voltage-limiting part of the SPD has been short-circuited by a very low impedance within the SPD

Note 2 to entry: The line is inoperable, but the equipment is still protected by a short circuit

mode 3 situation wherein the SPD has undergone an internal open circuit in the line, or an external disconnecter has operated, if any

Note 3 to entry: The line is inoperable, but the equipment is still protected by an open line

3.2.116**preferred values**

values for the parameters listed in the tables for the various tests, preferred in the sense that their use promotes uniformity and provides a means of comparison among various protective devices

Note 1 to entry: They also provide a common engineering language beneficial to the user and manufacturer of surge protectors used in telecommunications and signalling networks. However, specific applications may require values other than the preferred values of the tables.

3.2.117**resettable current limiting**

action of an SPD that limits current and can be manually reset after operating

3.2.118**return loss**

modulus of the reciprocal of the reflection factor, generally expressed in decibels (dB)

Note 1 to entry: When impedances can be defined, the return loss in dB is given by the formula:

$$20 \log_{10} \text{MOD} [(Z1+Z2)/(Z1-Z2)]$$

where $Z1$ is the characteristic impedance of the transmission line ahead of the discontinuity, or the impedance of the source, and $Z2$ is the impedance after the discontinuity or load impedance seen from the junction between the source and the load [IEV 702-07-25, modified]

3.2.119**self-resetting current limiting**

action of an SPD that limits current and will self-reset after the disturbing current is removed

3.3 Acronyms / Symbols

Clause 3.3 from part 01 applies

4 Classification**4.1 General**

Clause 4.1 from part 01 applies with the following additions, exemptions and replacement:

4.2 Number of ports

Clause 4.2 from part 01 does not apply.

4.3 SPD design

Clause 4.3 from part 01 applies with the following replacement:

4.3.1 Voltage switching SPD

Clause 4.3.1 from part 01 applies

4.3.2 Voltage clamping/limiting SPD

Clause 4.3.2 from part 01 applies

4.3.3 Combination SPD

Clause 4.3.3 from part 01 applies

4.4 Type of SPD

Clause 4.4 from part 01 does not apply.

1.5 Location

Clause 4.5 from part 01 applies.

1.6 Accessibility

Clause 4.6 from part 01 applies.

4.5 Mounting method

Clause 4.7 from part 01 does not apply.

1.7 Location of disconnecter (including overcurrent protection)

Clause 4.8 from part 01 applies.

1.9 Degree of protection provided by enclosures according to IEC 60529 (IP code)

Clause 4.9 from part 01 applies.

1.10 Temperature and humidity range

Clause 4.10 from part 01 applies.

4.6 SPD modes of protection

Clause 4.11 from part 01 applies.

1.11 End of life mode of the SPD assembly

Clause 4.12 from part 01 does not apply.

4.7 Short-Circuit Disconnection Component (SCDC)

Clause 4.13 from part 01 does not apply.

1.100 SPD configurations

The SPD configurations described in this standard are shown in **Figure 1**. Each SPD configuration is composed of one or more voltage-limiting components and may include current-limiting components.

Figure 1a – Two- connection SPD

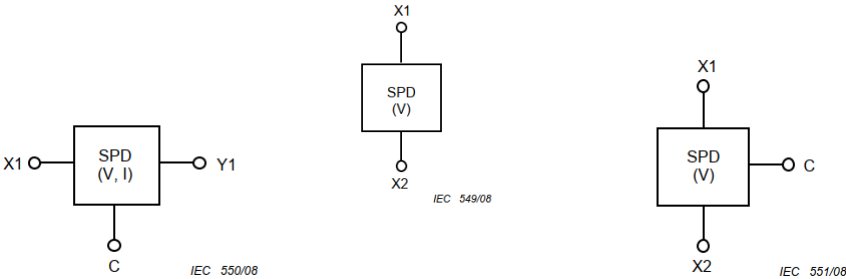
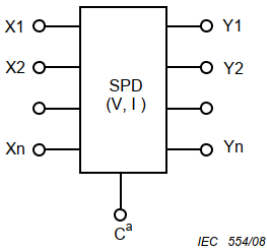


Figure 1b – Three- connection SPD Figure 1c – Three- connection SPD



Figure 1d – Four- connection SPD Figure 1e – Five- connection SPD



^a The common connection C may not be provided.

Figure 1f – Multi- connection SPD

598	Key	
599	V	voltage-limiting component
600	V, I	voltage-limiting components or a combination of voltage-limiting and current-limiting components
601	X1, X2...Xn	Input line connections
602	Y1, Y2...Yn	Output protected line connections
603	C	common connection

Figure 1 – SPD configurations

4.8 Overstressed fault mode acc. 3.2.115

4.8.1 Mode 1

4.8.2 Mode 2

4.8.3 Mode 3

1.101 Additional information about transmission and special applications

Information about transmission and special applications are listed in Annex D, E and F.

Convenors note: Due to the change in the scope (§ 1), section 4.103 will probably no longer be necessary (see document 37A_WG4_23-20). A decision will be made at the next WG4 meeting in November 2023.

4.9 Protective provisions of SPDs installed in application with more than 100 W

SPDs having an apparent power (U_C times I_L) above 100 W are designed to be installed in powerful application.

IEC 61643-21 is to be applied for such SPDs if at least one of the following criteria is met:

- **Criteria 1: Application in the context of a telecom and/or signalling network** (e.g., control systems, instrumentation and safety technology)
- **Criteria 2: Application in a local AC/DC supply application with reference to information technology equipment but no direct connection to supply networks.**
- **Criteria 3: Devices that provide data transfer and optional DC supply on a common electrical circuit** (e.g. PoE, signal circuits with remote supply, ...)

Such SPDs shall also meet the requirements “Additional tests for SPDs having U_C times $I_L > 100 W$ ” as listed in table 1.

Note: Mode 3 can also be reached if an external disconnecter has operated, if any.

However, these tests are not required if the SPD is intended to be installed in controlled circuits with a power management that ensure safe disconnection in case of a failure (e.g. RF / antenna application, PoE, PoDL, over-current-triggered fuse-breaking functions).

5 Void

6 Marking and other product information

Clause 6 from part 01 applies with the following additions, exemptions and replacements:

6.1 General

Clause 6.1 from part 01 applies with the following replacements:

The required markings to be placed on the SPD, are a1), a4) and a100) of 6.2. Other required markings shall appear in the installation instructions or on the packaging, or included in the product documentation (e.g. Web). Details are listed in 6.2.100 and 6.2.101.

The location can be also under a cover of the enclosure but shall be easily accessible by the end user (e.g. no tools). Any notes for special handling shall be included in the documentation or on the packaging.

Compliance is checked by visual inspection.

An SPD may be classified to more than one test category according to 6.2, a101) (e.g. C1 and C2).

6.2 List of items

Clause 6.2 from part 01 applies with the following additions:

a4) a4) from 6.2 of part 01 applies with the following addition:

NOTE: U_C is not valid for RF SPDs with quarterwave technology.

a100) Information that enables the manufacturer to trace the date of manufacture

a101) SPD category and discharge parameters (e.g. C2: 2 kV / 1 kA)

a102) Impulse reset time and corresponding U/I parameter for voltage switching SPDs and combination SPDs only

a103) AC durability and parameter for ac durability, if declared by the manufacturer

a104) Overstressed fault mode acc. 4.101 for SPDs having U_C times $I_L > 100$ W for

- Thermal disconnection test
- Overload behaviour test, if applicable
- Dedicated overstress test

a105) Transmission characteristics (capacitance, Insertion loss, return loss, longitudinal balance and near-end crosstalk), appropriate to the intended SPD use.

a106) Additional information, where applicable:

- replaceable components,
- discharge currents as, I_N , I_{imp} , I_{Total}
- Values for high temperature and humidity endurance test

a107) Series resistance, where applicable

a108) Current limiting parameter, if declared by the manufacturer

- Current response time for each test current
- Current reset time
- Maximum interrupting voltage for resettable current-limiting components (voltage, current and application)
- AC durability for current-limiting components (current, duration and applications)
- Impulse durability for current-limiting components

a109) insulation resistance for each mode of protection (if different), if declared by the manufacturer

NOTE: The insulation resistance is calculated by U_C (a4) divided by I_C (a24).

a110) over-stress factor n for SPDs having U_C times $I_L > 100$ W

a111) Installation in application protected against conductive contamination only

a112) Information related to transmission performances but not addressed by this standard (e.g. other standards)

a113) website address if declared by the manufacturer.

1.101.100 Information which shall be provided with the products to be delivered

The information indicated in a7) (if connections are not interchangeable) and a16) from 6.2 of part 01 shall be on or included in the packaging.

6.2.1 Information which shall be provided in the product documentation

The information indicated in a5), a8), a11), a14), a18), a19), a22), a23), a24), a101) shall be included in the documentation (e.g. Web). If applicable, the information indicated in a102), a103), and a105) to a111) shall be included in the documentation.

6.2.2 Information which shall be provided by the manufacturer for type testing, as applicable

Item a104).

6.3 Information about status indicator

Clause 6.3 from part 01 does not apply.

7 Service conditions

Clause 7 from part 01 applies.

8 Requirements

Clause 8 from part 01 applies with the following additions, exemptions and replacements:

8.1 General requirements

Clause 8.1 from part 01 applies with the following exemption and additions:

The requirement for SPDs classified to more than one type according to 6.2, a2) from part 01 does not apply.

Table 1 shows the requirements based on the type of SPD.

SPDs having an apparent power (U_C times I_L) > 100 W shall also meet the requirements "Additional tests for SPDs having U_C times $I_L > 100$ W" as shown in table 1.

For telecommunication applications ITU-T gives requirements in the K-series for protection holders (K.65) and termination modules (K.55).

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Table 1 – Type test requirements for SPDs

Requirement – Test	Sub-clause	Type of SPD					
		SPD with only voltage-limiting function	SPD with both voltage-limiting and current-limiting functions	SPD with voltage-limiting function and linear component (e.g. resistor, coil) between input/ output line connections	SPD having both voltage-limiting and current-limiting functions with enhanced transmission capabilities	SPD having only voltage-limiting function but intended for use in extended range environment	SPD having both voltage-limiting and current-limiting functions but intended for use in extended range environment
General test							
Identification and documentation	6	A	A	A	A	A	A
Marking	8.2 / 9.2	A	A	A	A	A	A
Transmission tests							
Capacitance	8.3.105.1 / 9.3.105.1	A	O	O	O	A	O
Insertion loss	8.3.105.2 / 9.3.105.2	O	A	A	A	O	A
Return loss	8.3.105.3 / 9.3.105.3	O	O	O	A	O	O
Longitudinal balance	8.3.105.4 / 9.3.105.4	O	O	O	A	O	O
Near-end crosstalk (NEXT)	8.3.105.5 / 9.3.105.5	O	O	O	A	O	O
Mechanical tests							
Mounting	8.4.1 / 9.4.1	A	A	A	A	A	A
Reliability of screws	8.4.2 / 9.4.2	A	A	A	A	A	A
Tests for external connections	8.4.3 / 9.4.3	A	A	A	A	A	A
Verification of air clearances and creepage distances	8.4.4 / 9.4.4	A	A	A	A	A	A
Mechanical strength	8.4.5 / 9.4.5	A	A	A	A	A	A
Resistance to ingress of solid objects and to harmful ingress of water	8.5.1 / 9.5.1	A	A	A	A	A	A
Resistance to abnormal heat and fire	8.5.3 / 9.5.3	A	A	A	A	A	A
Protection against direct contact	8.3.1.1 / 9.3.1	A	A	A	A	A	A

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Table 1 (continued)

Requirement – Test	Sub-clause	Type of SPD					
		SPD with only voltage-limiting function	SPD with both voltage-limiting and current-limiting functions	SPD with voltage-limiting function and linear component (e.g. resistor, coil) between Input/ output line connections	SPD having both voltage-limiting and current-limiting functions with enhanced transmission capabilities	SPD having only voltage-limiting function but intended for use in extended range environment	SPD having both voltage-limiting and current-limiting functions but intended for use in extended range environment
Environmental tests							
High temperature and humidity endurance	8.6.100 / 9.6.100	O	O	O	O	A	A
Environmental cycling with impulse durability	8.6.101 / 9.6.101	O	O	O	O	A	A
Environmental cycling with AC surges	8.6.102 / 9.6.102	O	O	O	O	O	O
Voltage limiting tests							
Continuous current	8.3.2 / 9.3.2	A	A	A	A	A	A
Insulation resistance	8.3.7 / 9.3.7	A	A	A	A	A	A
Impulse durability and voltage protection level ^a	8.3.100 / 9.3.100	A	A	A	A	A	A
Impulse reset	8.3.101 / 9.3.101	A	A	A	A	A	A
AC durability for voltage limiting function ^a	8.3.102 / 9.3.102	O	O	O	O	O	O
Blind spot test	8.3.103 / 9.3.103	A	A	A	A	A	A
Total discharge current I _{total} (for multimode SPDs)	8.6.4 / 9.6.4	O	O	O	O	O	O

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Table 1 (continued)

Requirement – Test	Sub-clause	Type of SPD					
		SPD with only voltage-limiting function	SPD with both voltage-limiting and current-limiting functions	SPD with voltage-limiting function and linear component (e.g. resistor, coil) between input/ output line connections	SPD having both voltage-limiting and current-limiting functions with enhanced transmission capabilities	SPD having only voltage-limiting function but intended for use in extended range environment	SPD having both voltage-limiting and current-limiting functions but intended for use in extended range environment
Current limiting tests							
Rated load current ^c	8.6.1.1 / 9.6.1.1	A	A	A	A	A	A
Series resistance	8.3.104.2 / 9.3.104.2	N.A.	A	A	A	N.A.	A
Current response time	8.3.104.3 / 9.3.104.3	N.A.	A	N.A.	A ^b	N.A.	A ^b
Current reset time	8.3.104.4 / 9.3.104.4	N.A.	A	N.A.	A ^b	N.A.	A ^b
Maximum interrupting voltage	8.3.104.5 / 9.3.104.5	N.A.	A	N.A.	A ^b	N.A.	A ^b
Operating duty test for current limiting function	8.3.104.6 / 9.3.104.6	N.A.	A	N.A.	A ^b	N.A.	A ^b
AC durability for current limiting function ^a	8.3.104.7 / 9.3.104.7	N.A.	A	N.A.	A ^b	N.A.	A ^b
Impulse durability for current limiting function ^a	8.3.104.8 / 9.3.104.8	N.A.	A	N.A.	A ^b	N.A.	A ^b
Additional tests for SPDs having U_c times $I_L > 100$ W							
Temperature withstand	8.5.2 / 9.3.6.1	A	A	A	A	A	A
Thermal protection	8.3.6.2 / 9.3.6.2	A	A	A	A	A	A
Overstress behaviour	8.3.6.4 / 9.3.6.4	A	A	A	A	A	A
Overload behaviour	8.6.1.2 / 9.6.1.2	A	A	A	A	A	A
A Applicable. N.A Not applicable. O Optional. ^a For each category of test impulse, a new set of samples can be used. ^b Applicable only for 3/4/5 multi connection SPD (see Figure 1b,1d, 1e and 1f). These are SPDs with X and Y connections.							

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8.2 Marking

Clause 8.2 from part 01 applies.

8.3 Electrical requirements

Clause 8.3 from part 01 applies with the following additions, exemptions and replacements :

8.3.1 Protection against electric shock

Clause 8.3.1 from part 01 applies with the following exemptions:

8.3.1.1 Protection against direct contact

Clause 8.3.1.1 from part 01 applies with the following exemptions:

This requirement does not apply for SPDs installed in standard telecom or RF/antenna applications.

This requirement only applies to SPDs having a U_c above 50 V AC and/or 60 V DC.

The requirement IP2XC only applies to SPDs having a U_c above 50 V AC and/or 60 V DC intended for the use in powerful applications.

8.3.1.2 Protection during maintenance and replacement

Clause 8.3.1.2 from part 01 does not apply.

8.3.2 Continuous current I_c

Clause 8.3.2 from part 01 applies.

8.3.3 Protective conductor current I_{PE}

Clause 8.3.3 from part 01 does not apply.

8.3.4 Voltage protection level U_P

Clause 8.3.4 from part 01 is replaced by 8.3.100:

8.3.5 Operating duty

Clause 8.3.5 from part 01 does not apply.

8.3.6 Disconnectors, SC-means and status indicators

Clause 8.3.6 from part 01 applies with the following exemptions:

8.3.6.1 Disconnector and SC-means

Clause 8.3.6.1 from part 01 applies with the following exemptions:

8.3.6.1.1 Disconnectors

Clause 8.3.6.1.1 from part 01 is replaced by:

SPDs rated U_c times $I_L > 100$ W classified with an overstressed fault mode 1 or 3 (open-circuit) according to 4.102.1 or 4.102.3 shall be provided with disconnectors (which can be either external, internal or both), except SPD's mode of protection for connection shield to earth or signal ground to earth only.

External disconnectors, if declared, shall comply with a relevant IEC standard, e.g. IEC 60269 series or IEC 60127 series for fuses, IEC 60934 for circuit breakers for equipment, IEC 60898 series, IEC 61009 series or IEC 60947-2 for circuit-breakers.

Compliance is checked by the tests in accordance with 9.3.6.

8.3.6.1.2 SC-means

Clause 8.3.6.1.2 part 01 is replaced by:

SPDs rated U_C times $I_L > 100$ W classified with an overstressed fault mode 2 (short-circuit) according to 4.102.2 shall be provided with internal SC-means that withstand overload current up to n times I_L without causing hazardous condition.

Compliance is checked by the tests in accordance with 9.3.6 and pass criterion Q.

8.3.6.2 Thermal protection

Clause 8.3.6.2 from part 01 applies with the following exemption:

This requirement only applies to SPDs rated U_C times $I_L > 100$ W.

8.3.6.3 Short circuit current behaviour

Clause 8.3.6.3 from part 01 does not apply.

8.3.6.4 Overstress behaviour

Clause 8.3.6.4 from part 01 applies with the following exemptions:

This requirement only applies to SPDs rated U_C times $I_L > 100$ W.

This test is also not performed on:

- SPDs for connection shield to earth or signal ground to earth only.

8.3.6.5 Status indicators

Clause 8.3.6.5 from part 01 does not apply.

1.101.7 Insulation resistance

Clause 8.3.7 from part 01 applies with the following additions:

This characteristic shall be stated by the manufacturer. However, I_{PE} or I_C can be stated instead.

NOTE: Insulation resistance is not valid for RF SPDs with quarterwave technology.

8.3.7 Dielectric withstand

Clause 8.3.8 from part 01 does not apply.

8.3.8 Behaviour under temporary overvoltages

Clause 8.3.9 from part 01 does not apply.

8.3.9 Maximum discharge current I_{max}

Clause 8.3.10 from part 01 does not apply.

1.101.100 Impulse durability and voltage protection level

The SPD shall be capable of withstanding the specified impulse durability without unacceptable changes in its characteristics.

For impulse durability, one impulse waveform of category C is mandatory. Further impulse waveforms and categories are optional.

The measured limiting voltage shall not exceed voltage protection level U_P according 6.2 a11) during the test with impulse durability of category C according to table 5.

NOTE: Testing of the Impulse limiting voltage " U_p " is optional for test categories A, B and D.

Compliance is checked by the test in accordance with 9.3.100.

8.3.10 Impulse reset

This requirement only applies to voltage switching SPDs and combination SPDs (combination of voltage switching components and voltage clamping components) according to 4.3. The SPD shall self-extinguish any follow current and return to its high-impedance state after an impulse application under energised conditions within its specified reset time.

This requirement does not apply for SPDs in HF/Antenna applications.

Compliance is checked in accordance with 9.3.101.

8.3.11 AC durability, if declared by the manufacturer

The category for SPDs with AC durability is A2.

The SPD shall be capable of withstanding the specified AC durability without unacceptable changes in its characteristics.

Compliance is checked in accordance with 9.3.102.

8.3.12 Blind spot

This requirement only applies to modes of protection having at least two protective current paths in parallel.

The SPD shall withstand impulses around the blind spot without unacceptable changes in its characteristics.

Compliance is checked in accordance with 9.3.103.

8.3.13 Current-limiting requirements**8.3.13.1 General**

SPDs having a linear component (e.g. resistor, inductance, etc.) between its input and output connection shall comply with the requirements according to 8.3.104.2 and 8.6.1.1.

SPDs containing additionally a current-limiting function shall comply with all of the following requirements.

8.3.13.2 Series resistance

The series resistance between the input (X_n) and output connections (Y_n) of the SPDs shall be within the specified values.

Compliance is checked in accordance with 9.3.104.2.

8.3.13.3 Current response time

The response time of the current-limiting component shall not exceed the specified value.

Compliance is checked in accordance with 9.3.104.3.

Additional information is given in ITU-T Recommendation K.82.

8.3.13.4 Current reset time

This requirement only applies to SPDs having self-resetting current limiting components. The current reset time of the current-limiting component shall not exceed the specified value.

Compliance is checked in accordance with 9.3.104.4.

8.3.13.5 Maximum interrupting voltage

This requirement only applies to SPDs containing self-resetting or manually resettable current-limiting component(s). The current-limiting component shall withstand the specified maximum interrupting voltage without unacceptable changes in its characteristics.