

STN	Nízkonapäťová ochrana pred prepätím Časť 41: Ochrana pred prepätím zapojená v nízkonapäťových distribučných sieťach DC Požiadavky a skúšobné metódy	STN EN IEC 61643-41 34 1395
------------	--	---

Low-voltage surge protective devices - Part 41: Surge protective devices connected to DC low-voltage power systems - Requirements and test methods

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 11/25

Obsahuje: EN IEC 61643-41:2025, IEC 61643-41:2025

141456



EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN IEC 61643-41

August 2025

ICS 29.240.10

English Version

**Low-voltage surge protective devices - Part 41: Surge protective
devices connected to DC low-voltage power systems -
Requirements and test methods
(IEC 61643-41:2025)**

Parafoudres basse tension - Partie 41: Parafoudres
connectés aux réseaux basse tension en courant continu -
Exigences et méthodes d'essai
(IEC 61643-41:2025)

Überspannungsschutzgeräte für Niederspannung - Teil 41:
Überspannungsschutzgeräte für den Einsatz in
Niederspannungs-Gleichstromnetzen - Anforderungen und
Prüfverfahren
(IEC 61643-41:2025)

This European Standard was approved by CENELEC on 2025-07-15. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard 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 CEN-CENELEC Management Centre or to any CENELEC member.

This European Standard 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 CEN-CENELEC Management Centre has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 61643-41:2025 (E)**European foreword**

The text of document 37A/426/FDIS, future edition 1 of IEC 61643-41, prepared by SC 37A "Low-voltage surge protective devices" of IEC/TC 37 "Surge arresters" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61643-41:2025.

The following dates are fixed:

- latest date by which the document has to be implemented at national (dop) 2026-08-31 level by publication of an identical national standard or by endorsement
- latest date by which the national standards conflicting with the (dow) 2028-08-31 document have to be withdrawn

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

This document is read in conjunction with EN IEC 61643-01.

This document has been prepared under a standardization request addressed to CENELEC by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

For the relationship with EU Legislation, see informative Annex ZZ, which is an integral part of EN IEC 61643-41:2025/A11:2025.

Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 61643-41:2025 was approved by CENELEC as a European Standard without any modification.

In the official version, for Bibliography, the following notes have to be added for the standard indicated:

IEC 62368-1:2018	NOTE	Approved as EN IEC 62368-1:2020 (not modified) + A11:2020
ISO 4892-1	NOTE	Approved as EN ISO 4892-1
ISO 4892-2	NOTE	Approved as EN ISO 4892-2



IEC 61643-41

Edition 1.0 2025-05

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage surge protective devices –
Part 41: Surge protective devices connected to DC low-voltage power systems –
Requirements and test methods**

**Parafoudres basse tension –
Partie 41: Parafoudres connectés aux réseaux basse tension en courant continu –
Exigences et méthodes d'essai**

**THIS PUBLICATION IS COPYRIGHT PROTECTED****Copyright © 2025 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 Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
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 corrigendum or an amendment might have been published.

IEC publications search -**webstore.iec.ch/advsearchform**

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 once a month by email.

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: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

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.

Recherche de publications IEC -**webstore.iec.ch/advsearchform**

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 une fois par mois par email.

Service Clients - webstore.iec.ch/csc

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

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

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	3
INTRODUCTION	5
1 Scope	6
2 Normative references	6
3 Terms, definitions and abbreviated terms	7
4 Classification	7
5 Void	7
6 Marking and other product information	7
7 Service conditions	8
8 Requirements	8
9 Tests	9
Annex AA (normative) Application of annexes from IEC 61643-01	20
Annex BB (normative) Test voltages for SPDs – U_{test}	21
Annex CC (normative) TOV test values for DC power systems	23
Annex DD (informative) DC power systems	25
Bibliography	31
Figure 100 – Procedure for sample preparation for dedicated overstress test	16
Figure 101 – Example of a test circuit for the TOV tests	18
Figure 102 – Timing diagram for the TOV tests	18
Figure DD.1 – TT DC distribution system	25
Figure DD.2 – TT DC distribution system with a mid-point	26
Figure DD.3 – TN-S DC distribution system	26
Figure DD.4 – TN-S DC distribution system with a mid-point	27
Figure DD.5 – TN-C DC distribution system with a mid-point	27
Figure DD.6 – TN-C DC distribution system	28
Figure DD.7 – TN-C-S DC distribution system	28
Figure DD.8 – TN-C-S DC distribution system with a mid-point	29
Figure DD.9 – IT DC distribution system	29
Figure DD.10 – IT DC distribution system with a mid-point	30
Table 100 – Type test requirements for SPDs	10
Table 101 – Prospective short circuit current and time constant	14
Table AA.1 – Application of annexes from IEC 61643-01	20
Table BB.1 – Test voltage values	22
Table CC.1 – TOV test values for DC power systems	23
Table CC.2 – Prospective short-circuit currents for TOV tests	24

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SURGE PROTECTIVE DEVICES –**Part 41: Surge protective devices connected to DC low-voltage power systems – Requirements and test methods**

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) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 61643-41 has been prepared by subcommittee 37A: Low-voltage surge protective devices, of IEC technical committee 37: Surge arresters. It is an International Standard.

This first edition only contains the specific requirements for SPDs for DC applications.

This International Standard is to be used in conjunction with IEC 61643-01.

The requirements of this document supplement, modify or replace certain of the general requirements contained in IEC 61643-01 and shall be read and applied together with the latest edition of IEC 61643-01, as indicated by the undated normative reference in Clause 2 of this document.

Numbering of clauses follows the numbering of IEC 61643-01, but, dependent on the application of clauses from IEC 61643-01, does not necessarily follow sequentially.

If a clause in IEC 61643-01 is not explicitly called up or referred to in this document, then this clause does not apply to SPDs covered by this document. Any instructions in this document calling up clauses from IEC 61643-01 are written in *Italic type*.

NOTE In other words, if e.g. Clause 4 is called up in this document all subclauses of Clause 4 of IEC 61643-01 are applied without modification. But, if e.g. some modifications are required on subclauses of Clause 9 of IEC 61643-01, then the relevant second level subclauses of IEC 61643-01 (e.g. 9.3, 9.5 etc.) are called up separately and it is indicated how they are applied.

The numbering of additional subclauses to IEC 61643-01 in this document starts with the number 100 in the last section of the subclause added (see e.g. 4.100). The numbering of additional tables and figures to IEC 61643-01 in this document starts with the number 100.

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

Draft	Report on voting
37A/426/FDIS	37A/430/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts of the IEC 61643 series can be found, under the general title *Low-voltage surge protective devices*, on the IEC website.

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

- reconfirmed,
- withdrawn, or
- revised.

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 document 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. It also covers abnormal situations that can be expected in practice.

This document takes into account the requirements of IEC 60364 as far as possible so that there is compatibility with the wiring rules when the SPD is connected to the supply mains. However, national wiring rules may differ.

If the intended applications of an SPD are covered by different parts of the IEC 61643-x1 series, all relevant parts shall be applied, as far as is reasonable.

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

This document addresses T1 SPD, T2 SPD and T3 SPD according to IEC 61643-01.

IEC 61643-12 addresses the general selection and application principles of SPDs, but focusing on SPDs for AC low-voltage power systems. A separate standard IEC 61643-42 is planned, which is intended to specifically address selection and application principles for SPDs for DC low-voltage power systems.

LOW-VOLTAGE SURGE PROTECTIVE DEVICES –

Part 41: Surge protective devices connected to DC low-voltage power systems – Requirements and test methods

1 Scope

This document, together with IEC 61643-01, 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 DC power circuits and equipment rated up to 1 500 V DC. Performance and safety requirements, tests and ratings are specified in this document. These devices contain at least one nonlinear component and are intended to limit surge voltages and divert surge currents.

The test requirements provided by this document are based on the assumption that the SPD is connected to a DC power circuit fed by a power source providing a linear voltage-current characteristic. When the SPD is to be connected to a different kind of source, careful consideration is required. This mainly applies with regard to system and fault conditions to be expected in such a system (e.g. expected short circuit current, TOV-stresses).

This document can apply for railway applications, when related product standards do not exist for that area or for certain applications.

Based on a risk assessment it might not be necessary to apply all requirements of this document to SPDs designed for specific power applications only, e.g. circuits with a low power capability, circuits supplied by nonlinear sources, circuits with protective separation from the utility supply.

NOTE 1 More information on risk assessment is provided in IEC Guide 116.

SPDs for PV applications are not covered by this document.

NOTE 2 Such SPDs for PV applications are covered by IEC 61643-31.

NOTE 3 Other exclusions based on national regulations are possible.

2 Normative references

For the purposes of this document the normative references given in IEC 61643-01 with the following additions 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, *Low-voltage surge protective devices – Part 01: General requirements and test methods*

koniec náhl'adu – text ďalej pokračuje v platenej verzii STN