

---

**Sestavi nizkonapetostnih stikalnih in krmilnih naprav - 5. del: Sestavi za distribucijo električne energije v javnih omrežjih (IEC 61439-5:2023)**

Low-voltage switchgear and controlgear assemblies - Part 5: Assemblies for power distribution in public networks (IEC 61439-5:2023)

Niederspannungs-Schaltgerätekombinationen - Teil 5: Schaltgerätekombinationen in öffentlichen Energieverteilungsnetzen (IEC 61439-5:2023)

Ensembles d'appareillage à basse tension - Partie 5: Ensembles pour réseaux de distribution publique (IEC 61439-5:2023)

**Ta slovenski standard je istoveten z: EN IEC 61439-5:2023**

[SIST EN IEC 61439-5:2023](http://standards.sist.si/standards/sist/61439-5:2023)

**ICS:**

29.130.20	Nizkonapetostne stikalne in krmilne naprave	Low voltage switchgear and controlgear
29.240.99	Druga oprema v zvezi z omrežji za prenos in distribucijo električne energije	Other equipment related to power transmission and distribution networks

**SIST EN IEC 61439-5:2023**

**en**



EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN IEC 61439-5**

September 2023

ICS 29.130.20

Supersedes EN 61439-5:2015;  
EN 61439-5:2015/AC:2015

English Version

**Low-voltage switchgear and controlgear assemblies - Part 5:  
Assemblies for power distribution in public networks  
(IEC 61439-5:2023)**

Ensembles d'appareillage à basse tension - Partie 5:  
Ensembles pour réseaux de distribution publique  
(IEC 61439-5:2023)

Niederspannungs-Schaltgerätekombinationen - Teil 5:  
Schaltgerätekombinationen in öffentlichen  
Energieverteilungsnetzen  
(IEC 61439-5:2023)

This European Standard was approved by CENELEC on 2023-09-06. 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.

[SIST EN IEC 61439-5:2023](https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbe2837991/sist-en-iec-61439-5-2023)

<https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbe2837991/sist-en-iec-61439-5-2023>



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 61439-5:2023 (E)

### European foreword

The text of document 121B/173/FDIS, future edition 3 of IEC 61439-5, prepared by SC 121B "Low-voltage switchgear and controlgear assemblies" of IEC/TC 121 "Switchgear and controlgear and their assemblies for low voltage" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 61439-5:2023.

The following dates are fixed:

- latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2024-06-06
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2026-09-06

This document supersedes EN 61439-5:2015 and all of its amendments and corrigenda (if any).

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 has been prepared under a Standardization Request addressed to CENELEC by the European Commission.

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 61439-5:2023 was approved by CENELEC as a European Standard without any modification. [SIST EN IEC 61439-5:2023](https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbc2837991/sist-en-iec-61439-5-2023)

<https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbc2837991/sist-en-iec-61439-5-2023>

## Annex ZA (normative)

### Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: [www.cenelec.eu](http://www.cenelec.eu).

The Annex ZA of EN IEC 61439-1:2021 applies with the following changes:

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
<i>Add the following references:</i>				
IEC 60695-11-10	2013	Fire hazard testing - Part 11-10: Test flames - 50 W horizontal and vertical flame test methods	EN 60695-11-10	2013
IEC 61439-1	2020	Low-voltage switchgear and controlgear assemblies - Part 1: General rules	EN IEC 61439-1	2021
IEC 62262	-	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)	EN 62262	-
ISO 6506-1	2014	Metallic materials - Brinell hardness test - Part 1: Test method	EN ISO 6506-1	2014
ISO 9223	2012	Corrosion of metals and alloys - Corrosivity of atmospheres - Classification, determination and estimation	EN ISO 9223	2012





IEC 61439-5

Edition 3.0 2023-05

# INTERNATIONAL STANDARD

# NORME INTERNATIONALE

---

**Low-voltage switchgear and controlgear assemblies –  
Part 5: Assemblies for power distribution in public networks**

**Ensembles d'appareillage à basse tension –  
Partie 5: Ensembles pour réseaux de distribution publique**

[SIST EN IEC 61439-5:2023](https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbc2837991/sist-en-iec-61439-5-2023)

<https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbc2837991/sist-en-iec-61439-5-2023>

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

COMMISSION  
ELECTROTECHNIQUE  
INTERNATIONALE

---

ICS 29.130.20

ISBN 978-2-8322-6939-8

**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
1 Scope .....	5
2 Normative references .....	6
3 Terms and definitions .....	7
4 Symbols and abbreviations .....	8
5 Interface characteristics .....	8
6 Information .....	8
7 Service conditions .....	9
8 Constructional requirements .....	10
9 Performance requirements .....	12
10 Design verification .....	12
11 Routine verification .....	27
Annexes .....	28
Annex L (informative) Guidance on verification of temperature rise .....	29
Annex AA (normative) Cross-section of conductors .....	30
Annex BB (informative) Items subject to agreement between the assembly manufacturer and the user .....	32
Annex CC (informative) Design verification .....	36
Annex DD (informative) List of notes concerning certain countries .....	37
Bibliography .....	38
Figure 101 – Typical distribution network .....	6
Figure 102 – Diagram of test to verify resistance to shock load of a PENDA-O .....	15
Figure 103 – Diagram of test to verify impact force withstand of a PENDA-O .....	16
Figure 104 – Diagram of test to verify the resistance to static load .....	17
Figure 105 – Sandbag for test to verify the resistance to shock load .....	18
Figure 106 – Diagram of test to verify resistance to torsional stress of a PENDA-O .....	20
Figure 107 – Diagram of test to verify the mechanical strength of doors .....	23
Figure 108 – Striker element for test of resistance to mechanical shock impacts induced by sharp-edged objects .....	24
Figure 109 – Typical test arrangement for mechanical strength of base .....	25
Table 101 – Values of assumed loading .....	8
Table 102 – Axial load to be applied to the inserts .....	24
Table AA.1 – Minimum and maximum cross-section of copper and aluminium conductors, suitable for connection (see 8.8) .....	30
Table AA.2 – Standard cross-sections of round copper conductors and approximate relationship between mm <sup>2</sup> and AWG/kcmil sizes (see 8.8 of IEC 61439-1:2020) .....	31
Table BB.1 – Items subject to agreement between the ASSEMBLY manufacturer and the user .....	32
Table CC.1 – List of design verifications to be performed .....	36



## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –****Part 5: Assemblies for power distribution in public networks**

## 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.

IEC 61439-5 has been prepared by subcommittee 121B: Low-voltage switchgear and controlgear assemblies, of IEC technical committee 121: Switchgear and controlgear and their assemblies for low voltage. It is an International Standard.

This third edition cancels and replaces the second edition published in 2014. This edition constitutes a technical revision.

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

- a) omission of the requirement to conduct mechanical tests at  $-25\text{ °C}$  when enclosures are made of a metallic material;
- b) addition of assumed loading factors generation supplies and electric vehicle charging applications;
- c) additional dielectric tests when a PENDA is used in a distribution substation with separate HV and LV earths;
- d) further clarification of representative samples for design verification.

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

Draft	Report on voting
121B/173/FDIS	121B/178/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](http://www.iec.ch/members_experts/refdocs). The main document types developed by IEC are described in greater detail at [www.iec.ch/publications](http://www.iec.ch/publications).

This document is to be read in conjunction with IEC 61439-1. The provisions of the general rules dealt with in IEC 61439-1 are only applicable to this document insofar as they are specifically cited. When this document states "addition", "modification" or "replacement", the relevant text in IEC 61439-1:2020 is to be adapted accordingly. Subclauses that are numbered with a 101 (102, 103 etc.) suffix are additional to the same subclause in IEC 61439-1:2020.

Tables and figures in IEC 61439-5:2023 that are new are numbered starting with 101.

New annexes in IEC 61439-5:2023 are lettered AA, BB, etc.

The reader's attention is drawn to the fact that Annex DD lists all of the "in-some-country" clauses on differing practices of a less permanent nature relating to the subject of this document.

A list of all parts of the IEC 61439 series, under the general title *Low-voltage switchgear and controlgear assemblies* can be found 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](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.

# LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

## Part 5: Assemblies for power distribution in public networks

### 1 Scope

This document defines the specific requirements for public electricity network distribution assemblies (PENDAs).

PENDAs have the following criteria:

- used for the distribution of electrical energy in three phase systems for which the rated voltage does not exceed 1 000 V AC (see Figure 101 for a typical distribution network) and DC systems not exceeding 1 500 V DC;
- stationary;
- open type assemblies are not covered by this document;
- suitable for installation in places where only skilled persons have access for their use, however, outdoor types can be installed in situations that are accessible to ordinary persons
  - intended for use in energy distribution in public power grids;
  - indoor use: assemblies for installation inside of electric power substations;
  - outdoor use: assemblies containing an enclosure suitable for open air installation.

The object of this document is to state the definitions and to specify the service conditions, construction requirements, technical characteristics and tests for PENDAs. Tests at higher performance level can be applicable with some network parameters.

PENDAs can also include control and or signalling devices associated with the distribution of electrical energy.

NOTE 1 Control and monitoring devices can be used in smart grid applications or the transmission of smart grid data.

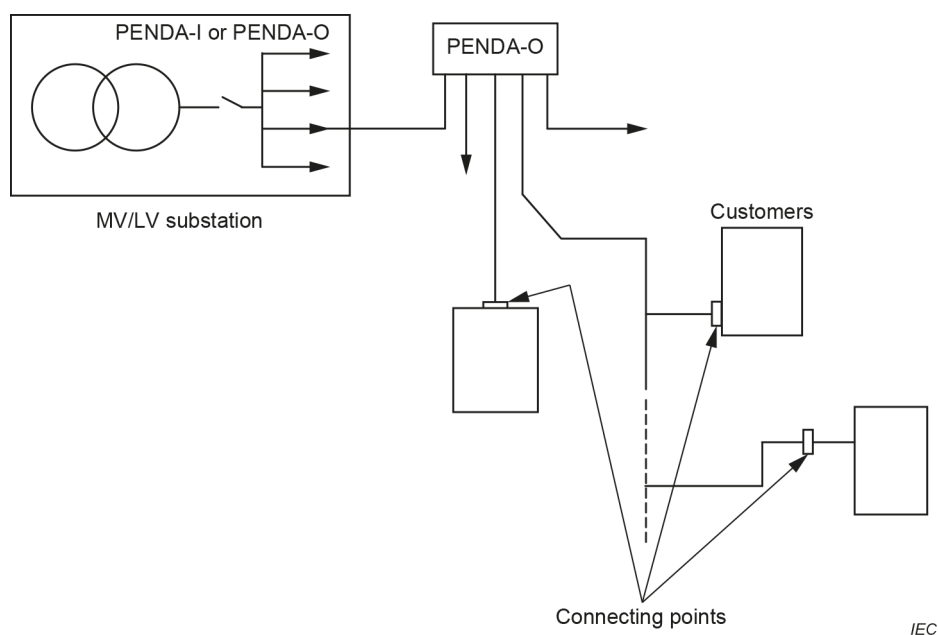
This document applies to all PENDAs whether they are designed, manufactured on a one-off basis or fully standardised and manufactured in quantity.

The manufacture and/or assembly can be carried out other than by the original manufacturer (see 3.10.1 of IEC 61439-1:2020).

This document does not apply to individual devices and self-contained components, such as motor starters, fuse switches, electronic equipment, etc. which comply with the relevant product standards.

If the substation is owned or operated by a public distribution system operator (DSO), PENDA's which are used as LV distribution panels in transformer substations are within the scope of this document,

This document does not apply to specific types of assemblies covered by other parts of IEC 61439 series.



**Figure 101 – Typical distribution network**

NOTE 2 If a PENDA is equipped with additional equipment (for example meters), in such a way that the main function is changed considerably, then other standards can also apply as agreed between user and manufacturer (see 8.5 of IEC 61439-1:2020).

NOTE 3 Where local regulations and practices permit, a PENDA according to this document can be used in other than public networks.

NOTE 4 DSO's can define additional requirements for their PENDA's.

## 2 Normative references

This clause of IEC 61439-1:2020 applies except as follows.

[SIST EN IEC 61439-5:2023](https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbc2837991/sist-en-iec-61439-5-2023)

[Addition: https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbc2837991/sist-en-iec-61439-5-2023](https://standards.iteh.ai/catalog/standards/sist/a0d97343-add6-4965-a276-e4dbc2837991/sist-en-iec-61439-5-2023)

IEC 60695-11-10:2013, *Fire hazard testing – Part 11-10: Test flames – 50 W horizontal and vertical flame test methods*

IEC 61439-1:2020, *Low-voltage switchgear and controlgear assemblies – Part 1: General rules*

IEC 62262, *Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)*

ISO 9223:2012, *Corrosion of metals and alloys – Corrosivity of atmospheres – Classification, determination and estimation*

ISO 6506-1:2014, *Metallic materials – Brinell hardness test – Part 1: Test method*