# IEC 61439-5

Edition 3.0 2023-05
REDLINE VERSION

# INTERNATIONAL STANDARD

colour inside

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



IEC 61439-5:2023-05 RLV(en)



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

INTERNATIONAL
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

# Part 5: Assemblies for power distribution in public networks

## FOREWORD

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**This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 61439-5:2014. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.**

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 °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. The main document types developed by IEC are described in greater detail at 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 in the data related to the specific document. At this date, the document will be

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- withdrawn,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

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# 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 ~~may~~ 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. ~~Network parameters may require~~ Tests at higher performance level can be applicable with some network parameters.

PENDAs ~~may~~ 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 ~~may~~ can be carried out other than by the original manufacturer (see 3.10.1 of IEC 61439-1:~~2011~~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.

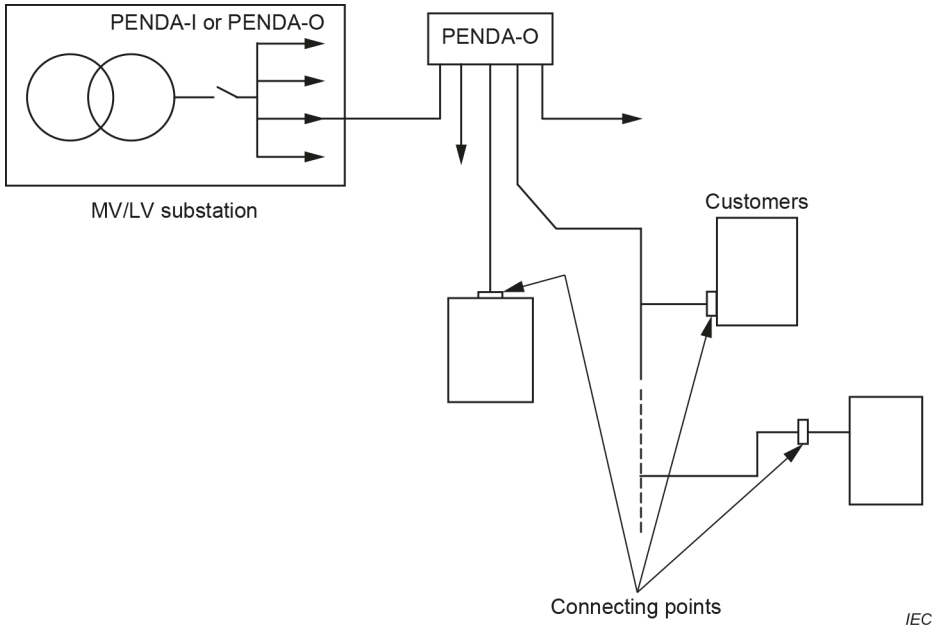



**Figure 101 – Typical distribution network**

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:~~2011~~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.

*Addition:*

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

IEC 61439-1:~~2011~~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*

## 3 Terms and definitions

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

### 3.1 General terms

*Additional terms:*

**3.1.101**
**public electricity network distribution assembly**
**PENDA**
assembly, generally for installation in a public electricity network which in use, receives electrical energy from one or more supplies and distributes that energy through one or more cables to other equipment

Note 1 to entry: A PENDA is installed, operated and maintained solely by skilled persons.

Note 2 to entry: Some types of a PENDA were previously known as a cable distribution cabinet (CDC).

**3.1.101.1**
**outdoor public electricity network distribution assembly**
**PENDA-O**
cubicle type public electricity network distribution assembly that is suitable for outdoor installation in places that ~~may~~ can, or ~~may not~~ cannot, be accessible to the public

**3.1.101.2**
**indoor public electricity network distribution assembly**
**PENDA-I**
public electricity network distribution assembly suitable for installation indoors, generally without an enclosure, but including all structural parts necessary to support busbars, functional units and other ancillary devices, necessary to complete the assembly

**3.1.102**
**design life**
minimum duration for which specified performance characteristics of equipment are expected when the equipment is operated as intended and regularly maintained by instructed persons in accordance with the manufacturer's instructions

[SOURCE: IEC 60050-395:2014, 395-07-93, modified – Note to entry omitted and 'granted' replaced by 'expected when ..... instructions'.]

### 3.3 External design of assemblies

**3.3.1**
**open-type assembly**
This term of IEC 61439-1:2020 does not apply.

### 3.9 Verification

*Modifications:*

**3.9.1**
**design verification**
Delete the note.

**3.9.1.2**
**verification comparison**
This term of IEC 61439-1:2020 does not apply.

**3.9.1.3**
**verification assessment**
This term of IEC 61439-1:2020 does not apply.

## 4 Symbols and abbreviations

This clause of IEC 61439-1:2020 applies.

## 5 Interface characteristics

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

### 5.4 Rated diversity factor (RDF)

*Addition:*

In the absence of an agreement between the assembly manufacturer and user concerning the actual load currents, the assumed loading of the outgoing circuits of the assembly or group of outgoing circuits ~~may~~ can be based on the values given in Table 101.

For distribution and final circuits, it is assumed that the load current is the rated current of the protective device, $I_n$, as required by the user, multiplied with the loading factor of Table 101.

**Table 101 – Values of assumed loading**

| ~~Number of main circuits~~ | ~~Assumed loading factor~~ |
|---|---|
| ~~2 and 3~~ | ~~0,9~~ |
| ~~4 and 5~~ | ~~0,8~~ |
| ~~6 to 9 inclusive~~ | ~~0,7~~ |
| ~~10 (and above)~~ | ~~0,6~~ |

| Application | Assumed loading factor |
|---|---|
| Regular distribution grid connections<br>2 to 3 circuits | 0,9 |
| Regular distribution grid connections<br>4 to 5 circuits | 0,8 |
| Regular distribution grid connections<br>6 to 9 circuits | 0,7 |
| Regular distribution grid connections<br>≥ 10 circuits | 0,6 |
| Generation supply (e,g. PV, wind farm, biomass) | 1,0 |
| Charging infrastructure for EV | 1,0 |