

INTERNATIONAL STANDARD

NORME INTERNATIONALE



**Low-voltage switchgear and controlgear assemblies –
Part 3: Distribution boards intended to be operated by ordinary persons (DBO)**

**Ensembles d'appareillage à basse tension –
Partie 3: Tableaux de répartition destinés à être utilisés par des personnes
ordinaires (DBO)**

[IEC 61439-3:2024](https://standards.iteh.ai/standards/iec/10fc8729-ac44-499e-af17-aff0f8c909b4/iec-61439-3-2024)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –**Part 3: Distribution boards intended to be operated
by ordinary persons (DBO)**

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IEC 61439-3 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 second edition cancels and replaces the first edition published in 2012. This edition constitutes a technical revision.

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

- a) alignment with the structure of IEC 61439-1:2020;
- b) inclusion in the scope of more examples of the type of protection and control devices;
- c) deletion of type A and type B DBOs;

- d) addition of a new Annex BB related to DBOs used in a prosumer's electrical installation (PEI);
- e) addition of a new Annex CC related to rated current of a DBO with additional source of supply in parallel/simultaneously with another source that is connected to the DBO e.g. PV.

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

Draft	Report on voting
121B/193/FDIS	121B/195/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 61439-1:2020. 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 this document that are new are numbered starting with 101.

New annexes in this document 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 in the IEC 61439 series, published 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, or
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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

Part 3: Distribution boards intended to be operated by ordinary persons (DBO)

1 Scope

This part of IEC 61439 defines the specific requirements for distribution boards intended to be operated by ordinary persons (abbreviated DBO throughout this document, see 3.1.101) as follows:

- assemblies intended to be operated by ordinary persons (e.g. switching operations and replacing fuse-links), e.g. in domestic (household) applications;
- assemblies containing outgoing circuits with protective devices intended to be operated by ordinary persons, complying e.g. with IEC 60898-1, the IEC 61008 series, the IEC 61009 series, IEC 62606, IEC 62423 and IEC 60269-3;
- assemblies for applications where the nominal voltage to earth does not exceed 300 V AC (see Table G.1 of IEC 61439-1:2020);

NOTE The voltage limits for DC applications are under consideration.

- assemblies with a rated current (I_{nc}) of the outgoing circuits not exceeding 125 A and a rated current (I_{nA}) not exceeding 250 A;
- assemblies intended for use in connection with the generation, transmission, distribution and conversion of electrical energy, and for the control of equipment consuming electrical energy and for associated data processing;
- enclosed, stationary assemblies;
- assemblies for indoor or outdoor use.

DBOs can contain protection devices, control devices, signalling devices alone or a combination of devices e.g. circuit-breakers, load shedding relay, energy management, communication devices, lighting control.

This document does not apply to an empty enclosure nor to individual devices and self-contained components, such as circuit-breakers, fuse-switches, electronic equipment. which comply with the relevant product standards, it describes the integration of devices, or self-contained components, or both, into a DBO or into an empty enclosure forming a DBO.

This document applies to DBOs designed, manufactured, and verified on a one-off basis or fully standardized and manufactured in quantity.

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

NOTE Enclosures for electrical accessories for household and similar fixed electrical installations are covered in IEC 60670-24.

2 Normative references

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.

Clause 2 of IEC 61439-1:2020 is applicable in addition to the following.

Addition:

IEC 60068-2-75, *Environmental testing – Part 2-75: Tests – Test Eh: Hammer tests*

IEC 60269-3, *Low-voltage fuses – Part 3: Supplementary requirements for fuses for use by unskilled persons (fuses mainly for household and similar applications) – Examples of standardized systems of fuses A to F*

IEC 60364-8-82, *Low-voltage electrical installations – Part 8-82: Functional aspects – Prosumer's low-voltage electrical installations*

IEC 60898-1, *Electrical accessories – Circuit-breakers for overcurrent protection for household and similar installations – Part 1: Circuit-breakers for a.c. operation*

IEC 60669-2-4, *Switches for household and similar fixed electrical installations – Part 2-4: Particular requirements – Isolating switches*

IEC 60947-3, *Low-voltage switchgear and controlgear – Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units*

IEC 61008 (all parts), *Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs)*

IEC 61009 (all parts), *Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs)*

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

IEC 62423:2009, *Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses*

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

IEC 62606, *General requirements for arc fault detection devices*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 61439-1:2020 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

Clause 3 of IEC 61439-1:2020 is applicable except as follows.

3.1 General terms

Additional terms and definitions:

3.1.101

distribution board intended to be operated by ordinary persons

DBO

assembly used to distribute and control electrical energy for all types of electrical supplies and loads, intended for operation by ordinary persons

Note 1 to entry: For operation by ordinary persons, see 8.4.6.1 of IEC 61439-1:2020.

Note 2 to entry: Switching operations and replacing fuse-links are examples of operations intended to be carried out by ordinary persons.

Note 3 to entry: Definition 3.1.101 does not preclude the DBO from being operated by skilled or instructed persons, and also being used in non-domestic installations.

Note 4 to entry: DBOs can be assembled outside the factory of the original manufacturer. DBOs can be assembled by the original manufacturer or by an assembly manufacturer.

4 Symbols and abbreviations

Clause 4 of IEC 61439-1:2020 is applicable.

5 Interface characteristics

Clause 5 of IEC 61439-1:2020 is applicable except as follows.

5.1 General

Addition:

This objective can be achieved through one of two typical processes; the user will either select a catalogue product, the characteristics of which meet the required user needs, or make a specific agreement with the manufacturer.

In both cases, the specification schedule according to Annex AA is intended to help the user to provide all data necessary to specify, and to help the manufacturer to provide the actual DBO characteristics. In some cases information declared by the DBO manufacturer may take the place of an agreement.

5.2.4 Rated impulse withstand voltage (U_{imp}) (of the assembly)

Replacement:

The rated impulse withstand voltage of the assembly shall be equal to or higher than the values stated for the transient overvoltages occurring in the electrical system(s) to which the circuit is designed to be connected.

DBOs shall comply with a minimum overvoltage category III (see IEC 60364-4-44) according to Table G.1 of IEC 61439-1:2020.

5.3.1 Rated current of an assembly (I_{nA})

Addition:

See Annex CC for examples of when a generator, for example a photovoltaic system, wind turbine, battery is used as additional source(s) of supply in parallel with another source that is connected to the DBO.

5.4 Rated diversity factor (RDF)

Addition:

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

The assumed load current is the rated current of the protective device I_n , as required by the user, multiplied with the assumed loading factor of Table 101.

NOTE 101 The rated current I_n of a protective device is defined in their product standard.

6 Information

Clause 6 of IEC 61439-1:2020 is applicable except as follows.

6.1 Assembly designation marking

Addition to the first paragraph:

The test of 10.2.7.1 only applies to DBOs intended for outdoor installation.

Addition of the following new item: <https://standards.iteh.ai/IEC/61439-3:2024/1s/iec/10fc8729-ac44-499e-af17-aff0f8c909b4/iec-61439-3-2024>

h) degree of protection if greater than IP2XC.

6.2.2 Instructions for handling, installation, operation and maintenance

Addition to the first paragraph:

The original or assembly manufacturer shall provide in their documentation, any routine verification required to be carried out by the installer for the DBO to conform to IEC 61439-3.

6.3 Device and/or component identification

Addition:

For RCDs supplying more than one final circuit, it shall be possible for ordinary persons to identify which outgoing circuits the RCD supplies, for example when the RCD is adjacent to the outgoing group of circuits it supplies or by providing labels for the installer to apply to the DBO after installation. The identification means shall be visible without accessing live parts.

7 Service conditions

Clause 7 of IEC 61439-1:2020 is applicable except as follows.

7.1.2 Pollution degree

Addition:

A minimum pollution degree 2 applies.

7.2 Special service conditions

Addition:

NOTE 101 The effects upon a DBO design and related ratings, instructions, etc. when used in a prosumer's electrical installation (PEI) can take account of the relevant requirements in IEC 60364-8-82. See Annex BB.

8 Constructional requirements

Clause 8 of IEC 61439-1:2020 is applicable except as follows.

8.1.3.2.2 Resistance of insulating materials to normal heat

Addition:

NOTE 101 This Subclause 8.1.3.2.2 also applies to covers and enclosures made of insulating materials.

8.2.1 Protection against mechanical impact (IK code)

Replacement:

The DBO shall comply with the following IK codes according to IEC 62262:

- IK05 for a DBO for indoor use;
- IK07 for a DBO for outdoor use.

Compliance shall be verified according to 10.2.6.

8.2.2 Protection against contact with live parts, ingress of solid foreign bodies and water (IP code)

Replacement of the second paragraph:

The degree of protection of a DBO shall be at least IP2XC after installation in accordance with the DBO manufacturer's instructions.

IP2XC shall be maintained when operating devices e.g. switching and operating test buttons in normal use. The degree of protection can be temporarily reduced when permitted in a product standard for use by ordinary or unskilled persons e.g. IEC 60269-3 for replacing a fuse-link.

NOTE 101 A DBO can have more than one IP rating e.g. door open IP2XC and door closed IP3X or drain holes IPXXD.

Paragraphs 5 and 6 and the associated examples in IEC 61439-1 do not apply to this document.

8.4.2.3 Barriers or enclosures

Replacement of the first paragraph:

Bare live parts shall be inside enclosures or behind barriers. The enclosures or barriers shall provide a degree of protection of at least IPXXC.

8.5.3 Selection of switching devices and components

Addition:

When a switch-disconnector, circuit-breaker without overcurrent protection or an isolating switch is incorporated in the DBO, it shall conform to IEC 60947-3, IEC 60947-2 or IEC 60669-2-4 as appropriate to the DBO ratings.

Outgoing circuits shall contain protective devices, intended to be operated by ordinary persons, for example conforming to IEC 60898-1, the IEC 61008 series, the IEC 61009 series, IEC 62423, IEC 62606 and IEC 60269-3.

An incoming protective device incorporated within the DBO not conforming to a product standard intended to be operated by ordinary persons, shall require a key or tool for re-closing after tripping and for the replacement of a fuse-link. Alternatively, a label shall be located in the vicinity of the incoming protective device stating that re-closing of the tripped device and the replacement of a fuse-link shall only be carried out by an instructed or skilled person.

Circuit-breakers shall be designed or installed in a way that it shall not be possible to modify their settings or calibration without a deliberate act involving the use of a key or tool.

NOTE 101 These requirements reflect that protective device product standards for ordinary people are limited to a maximum rated current of 125 A. Household premises can require electrical supplies greater than 125 A and the use of DBOs therefore, these particular installations are within the scope of IEC 61439-3.

8.6.1 Main circuits

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Replacement of the second paragraph:

Each of the conductors between the incoming unit and outgoing unit as well as the components included in these units can be rated on the basis of the reduced short-circuit stresses occurring on the load side of the respective outgoing short-circuit protective device, provided that these conductors are arranged so that an internal short-circuit between live parts and between live parts and earth is not to be expected as required by 8.6.4 and Table 4 of IEC 61439-1:2020.

8.8 Terminals for external cables

Addition:

When a device or component in an outgoing circuit does not incorporate a neutral terminal, the number of neutral terminals of a DBO shall be not less than one outgoing terminal for each outgoing circuit requiring a neutral terminal. These terminals shall be located or identified in the same sequence as their respective line conductor terminals.

The maximum number of neutral conductors that are permitted to be connected to each device or component neutral terminal, shall be as stated in the manufacturer's instructions.

DBOs shall have a minimum of two terminals for electrical installation protective bonding conductors.

9 Performance requirements

Clause 9 of IEC 61439-1:2020 is applicable except as follows.

9.1.1 General

Addition:

NOTE IEC 60664-1:2020 contains the requirements for supplementary and reinforced insulation (Class II).

10 Design verification

Clause 10 of IEC 61439-1:2020 is applicable except as follows.

10.2.2.2 Severity test A

Addition:

The following is an alternative test.

All grease is removed from the parts or representative samples of the steel enclosures of the DBO to be tested, by immersion in a cold chemical degreaser such as methyl chloroform or refined petrol for 10 min. The parts are then immersed for 10 min in a 10 % solution of ammonium chloride in water at a temperature of $(20 \pm 5) ^\circ\text{C}$.

Without drying but after shaking off any drops, the parts are placed for 10 min in a box containing air saturated with moisture at a temperature of $(20 \pm 5) ^\circ\text{C}$.

After the parts have dried for 10 min in a heating cabinet at a temperature of $(100 \pm 5) ^\circ\text{C}$ and have been left at room temperature for 24 h, their surfaces shall show no signs of iron oxidization.

Traces of iron oxide on sharp edges and any yellowish film removable by rubbing are ignored.

For small helical springs and the like, and for inaccessible parts exposed to abrasion, a layer of grease can provide sufficient protection against iron oxidization. Such parts are subjected to the test only if there is doubt about the effectiveness of the grease film, and the test is then made without previous removal of the grease.

10.2.2.4 Results to be obtained

The first paragraph of 10.2.2.4 of IEC 61439-1:2020 does not apply to the alternative test of this document.

10.2.3.2.1 Verification by test

Addition:

NOTE 101 850 °C does not apply to accessible parts of the enclosure after mounting in hollow walls e.g. covers, doors.

10.2.6 Verification of protection against mechanical impact (IK code)

Replacement:

Verification of the degree of protection against mechanical impacts shall be carried out in accordance with IEC 62262.

The test shall be carried out by means of a hammer test apparatus as described in IEC 60068-2-75, for example an impact spring hammer at an ambient air temperature between 10 °C and 40 °C immediately after the DBO has been kept for 2 h at a temperature of $-5\text{ °C} \pm 1\text{ K}$ for indoor use and $-25\text{ °C} \pm 1\text{ K}$ for outdoor use. A test at -25 °C for outdoor use also validates the -5 °C for indoor use, so only one test at -25 °C is required.

Compliance is checked on those exposed parts of the DBO which can be subjected to mechanical impact when mounted as in normal use.

The sample with a cover, or the enclosure, if any, shall be fixed as in normal use or placed against a rigid support.

Three blows shall be applied on separate places of each of the accessible faces and door (if provided). The impacts shall be evenly distributed on the faces of the enclosure(s) under test. In no case shall the impacts be applied in the surrounding area of the same point of the enclosure. A new sample for each accessible face is used, unless the previous test has not influenced the results of the subsequent test(s), then the sample may be reused. The blows shall not be applied to knock-outs, built-in components complying with other standards, or other fastening means which are recessed below the surface so as not to be subjected to an actual impact.

Cable entries which are not provided with knock-outs shall be left open. If they are provided with knock-outs, two of them shall be opened.

Before applying the blows, fixing screws of bases, covers and the like shall be tightened with a torque equal to that specified in Table 102.

After the test, a visual inspection shall verify that:

- the degree of protection (IP code) of the enclosure is not impaired, where doubt exists the appropriate IP test according to 10.3 should be carried out;
- dielectric properties have been maintained, where doubt exists the appropriate dielectric tests according to 10.9 of IEC 61439-1:2020 as modified in this document, should be carried out;
- removable covers can be removed and reinstalled;
- doors can be opened and closed.

10.2.7.1 Verification by test

Addition of a new first paragraph:

This test only applies to DBOs intended for outdoor installation.

10.2.8 Mechanical operation

10.2.8.1 Verification by test

Replacement of the first and second sentences of the second paragraph:

For parts, required to be verified by test e.g. mobile parts such as doors (see 8.1.5 of IEC 61439-1:2020), satisfactory mechanical operation shall be verified after installation in the DBO. The number of operating cycles shall be 50.

10.3 Degree of protection of assemblies (IP Code)

Replacement of the second paragraph and dashed items:

Degree of protection (IP code) tests shall be carried out: