

INTERNATIONAL STANDARD



**Low-voltage switchgear and controlgear assemblies –
Part 4: Particular requirements for assemblies for construction sites (ACS)**

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**Low-voltage switchgear and controlgear assemblies –
Part 4: Particular requirements for assemblies for construction sites (ACS)**

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CONTROLGEAR ASSEMBLIES –****Part 4: Particular requirements for assemblies
for construction sites (ACS)****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 61439-4:2012. 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 61439-4 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 of IEC 61439-4 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 IEC 61439-1:2020 regarding the structure and technical content, as applicable.

The text of this document is based on the following documents:

Draft	Report on voting
121B/183/FDIS	121B/188/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 61439-1:2020 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.

In this document, terms written in small capitals are defined in Clause 3.

The reader’s attention is drawn to the fact that Annex N 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 4: Particular requirements for assemblies for construction sites (ACS)

1 Scope

NOTE Throughout this document, the abbreviation ACS (assembly for construction site, see 3.1.101) is used for a low-voltage switchgear and controlgear assembly intended for use on construction and similar sites.

This document defines the specific requirements of ACS as follows:

- assemblies for which the rated voltage does not exceed 1 000 V in case of AC or 1 500 V in case of DC;
- assemblies where the nominal primary voltage and the nominal secondary voltage of transformers incorporated in ACS are within the limits specified above;
- assemblies intended for use on construction sites, both indoors and outdoors, i.e. temporary places of work to which the public do not generally have access and where building construction, installation, repairs, alteration or demolition of property (buildings) or civil engineering (public works) or excavation or any other similar operations are carried out;
- transportable (semi-fixed) or MOBILE assemblies with enclosure.

The manufacture and/or assembly ~~may~~ can be carried out by an entity 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 will comply with the relevant product standards.

This document does not apply to assemblies for use in the administrative centres of construction sites (offices, cloakrooms, ~~ASSEMBLY~~ meeting rooms, canteens, restaurants, dormitories, toilets, etc.).

Requirements for electrical protection provided by equipment manufactured according to this document are given in IEC 60364-7-704.

2 Normative references

This clause of IEC 61439-1:2020 is applicable except as follows:

Addition:

IEC 60068-2-27:2008, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-42:2003, *Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60364-7-704:2005/2017, *Low-voltage electrical installations – Part 7-704: Requirements for special installations or locations – Construction and demolition site installations*

~~IEC 61140:2001, Protection against electric shock – Common aspects for installation and equipment~~

IEC 61439-1:2014/2020, Low-voltage switchgear and controlgear assemblies – Part 1: General rules

IEC 61558-2-23, Safety of transformers, reactors, power supply units and combinations thereof – Part 2-23: Particular requirements and tests for transformers and power supply units for construction sites

3 Terms and definitions

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

Additional terms and definitions:

3.1 General terms

3.1.101

low-voltage switchgear and controlgear assembly for construction sites ACS

combination of one or several transforming or low voltage switching devices with associated control, measuring, signalling, protective and regulating equipment complete with all their internal electrical and mechanical connections and structural parts, designed and built for use on all construction sites, indoors and outdoors

3.2 Constructional units of assemblies

3.2.101

metering unit

functional unit equipped with apparatus for metering electrical energy

3.2.102

transformer unit

functional unit consisting mainly of one or several transformers

Modifications:

3.3 External design of assemblies

3.3.1

open-type assembly

This term of IEC 61439-1:2020 does not apply.

3.3.2

dead-front assembly

This term of IEC 61439-1:2020 does not apply.

Replacement:

3.3.3

enclosed ACS

ACS which is enclosed on all sides with the possible exception of its mounting surface in such a manner as to provide a defined degree of protection

3.3.7

box-type ACS

ENCLOSED ACS intended:

- either to be mounted on a vertical surface;
- or to stand on a horizontal surface supported by feet or legs (articulated or not) or by a mounting not forming part of the ACS (see 3.4.2 of IEC 61439-1:2020)

Modification:

3.5 Conditions of installation of assemblies

3.5.1

assembly for indoor installation

This term of IEC 61439-1:2020 does not apply (see 3.1.101).

3.5.2

assembly for outdoor installation

This term of IEC 61439-1:2020 does not apply (see 3.1.101).

3.5.3

stationary assembly

This term of IEC 61439-1:2020 does not apply.

3.5.4

movable assembly

This term of IEC 61439-1:2020 does not apply.

Additional terms and definitions:

3.5.101

transportable ACS

semi-fixed ACS

ACS intended for use in a place where it is not permanently fixed

Note 1 to entry: The location of a TRANSPORTABLE ACS ~~may~~ can vary during work on the same site. When the equipment is moved to another place, it is first disconnected from the supply.

3.5.102

mobile ACS

ACS capable of being moved as work advances on the site, without being disconnected from the supply

Additional terms and definitions:

3.101 Function of the ACS

3.101.1

incoming supply function

suitability for connection of the ACS either to electricity public supply network or to the transformer substation or to on site generator

3.101.2

metering function

suitability for the metering of electrical energy consumed on the site

3.101.3**distribution function**

suitability to provide the distribution and protection of electrical supply on the construction site by means of terminal connection or socket-outlets

3.101.4**transformer function**

suitability to provide means for transformer voltages or to provide measures of electrical protection

Note 1 to entry: Details for their requirements are given in 101.1.

4 Symbols and abbreviations

This clause of IEC 61439-1:2020 is applicable.

5 Interface characteristics

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

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

Replacement of title and text:

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

The rated current of an ACS is ~~that~~ **group rated current I_{ng}** of its incoming circuit.

This current shall be carried without the temperature rise of the individual parts exceeding the limits specified in 9.2 of IEC 61439-1:2020.

5.4 Rated diversity factor (RDF)

Addition:

The assumed loading of the outgoing circuits of the ACS or group of outgoing circuits shall be declared by the assembly manufacturer and ~~may~~ **can** be based on the values in Table 101.

When the manufacturer does not declare any RDF, the values of Table 101 apply.

5.6 Other characteristics

Replacement:

The following characteristics shall be declared:

- a) the function(s) assigned by the manufacturer (see 3.101);
- b) the external design (see 3.3);
- c) the mobility (see 3.5.101 and 3.5.102);
- d) the degree of protection (see 8.2);
- e) the method of mounting, for example fixed or removable parts (see 8.5.1 and 8.5.2);
- f) protection against electric shock (see 8.4);
- g) the resistance to corrosion (see 10.2.2.101);
- h) special service conditions, if applicable (see 7.2);

- i) electromagnetic compatibility (EMC) classification (see Annex J of IEC 61439-1:2020).

6 Information

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

6.1 Assembly designation marking

Replacement of title and text:

6.1 ACS designation marking

The assembly manufacturer shall provide each ACS with one or more labels, marked in a durable manner and located in a place such that they are visible and legible when the ACS is installed and in operation.

Compliance is checked according to the test of 10.2.7 and by inspection.

The following information regarding the ACS shall be provided on the label(s):

- a) assembly manufacturer's name or trade mark (see 3.10.2);
- b) type designation or identification number or any other means of identification, making it possible to obtain relevant information from the assembly manufacturer;
- c) means of identifying date of manufacture;
- d) IEC 61439-4;
- e) type of current (and the frequency in the case of AC);
- f) rated voltage (U_n) (of the ACS) (see 5.2.1);
- g) rated current of the ACS (I_{nA}) (see 5.3.1);
- h) degree of protection (see 8.2);
- i) the weight where this exceeds 30 kg.

If the indication of the name or trademark of the manufacturer appears on the ACS, it ~~need~~ shall not be given on the nameplate.

6.2.1 Information relating to the assembly

Replacement of title and text:

6.2.1 Information relating to the ACS

The following additional information, where applicable, shall be provided in the assembly manufacturer's technical documentation supplied with the ACS:

- a) rated operational voltage (U_e) (of a circuit) (see 5.2.2);
- b) rated impulse withstand voltage (U_{imp}) (see 5.2.4);
- c) rated insulation voltage (U_i) (see 5.2.3);
- d) rated current of each circuit (I_{nc}) (see 5.3.2);
- e) rated peak withstand current (I_{pk}) (see 5.3.4);
- f) rated short-time withstand current (I_{cw}) together with its duration (see 5.3.4);
- g) rated conditional short-circuit current (I_{cc}) (see 5.3.5);
- h) rated frequency (f_n) (see 5.5);

- i) rated diversity factor(s) (RDF) (see 5.4);
- j) functions (see 3.101);
- k) all necessary information relating to the other declared classifications and characteristics (see 5.6);
- l) the short-circuit withstand strength and characteristics of short-circuit protective device(s) (see 9.3.2);
- m) overall dimensions (including projections e.g handles, covers, doors).

6.2.2 Instructions for handling, installation, operation and maintenance

Addition:

The manufacturer of the ACS should specify in its technical documentation supplied with the ACS the other types of assemblies which ~~may~~ can be connected to it. This information should indicate whether the compatibility is based upon the type of system earthing employed and/or on the need for co-ordination of the electrical protection within the complete installation.

The manufacturer should furnish the appropriate documentation for the purpose to maintain the protective measures and the co-ordination of the protective devices within the complete installation.

7 Service conditions

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

Modifications:

~~7.1.1 Ambient air temperature~~

~~This subclause of Part 1 is not applicable.~~

~~Replacement of title and text:~~

~~7.1.1 Ambient air temperature for ACS installations~~

~~The ambient air temperature does not exceed +40 °C and its average over a period of 24 h does not exceed +35 °C.~~

~~The lower limit of the ambient air temperature is –25 °C.~~

~~7.1.2 Humidity conditions~~

~~This subclause of Part 1 is not applicable.~~

~~Replacement of title and text:~~

~~7.1.2 Humidity conditions for ACS installations~~

~~The relative humidity may temporarily be as high as 100 % at a maximum temperature of +25 °C.~~

7.1.32 Pollution degree

Replacement of the last paragraph with:

Only pollution degrees 3 and 4 are applicable.

The microenvironment ~~may~~ can be reduced to pollution degree 2 if the degree of protection of the enclosure is at least IP5X and care is taken to avoid condensation.

7.2 Special service conditions

Addition of the following new item:

~~m~~n) heavily polluted atmosphere.

8 Constructional requirements

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

8.1.1 General

Addition:

All the apparatus shall be placed inside the enclosure fitted with such removable panels, cover plates or doors as ~~may be required~~ applicable for connection or maintenance with the possible exception of the items mentioned in 8.101 provided that they withstand the service conditions of Clause 7 and the requirements of 8.1.2 and 8.1.6.

8.1.2 Protection against corrosion

Replacement:

Protection against corrosion shall be ensured by the use of suitable materials or by protective coatings to the exposed surface taking account of the normal service conditions (see 7.1) and/or special service condition (see 7.2). Compliance to this requirement is checked by the test of 10.2.2.

8.1.4 Resistance to ultra-violet (UV) radiation

Replacement:

For enclosures and external parts made of insulating materials, resistance to ultra-violet radiation shall be verified according to 10.2.4.

For external parts made of insulating material of components covered by other IEC standard (for examples socket-outlets, handles of switch, push buttons, etc.), this test is not required.

8.1.5 Mechanical strength

Addition:

The ACS shall be constructed to withstand mechanical shocks having an acceleration of 500 m/s^2 , a pulse shape of a half-sine wave of 11 ms duration (commensurate with equipment being carried loose in normal road or rail vehicles for long periods).

Compliance is verified according to 10.2.6.

8.1.6 Lifting provision

Replacement:

Lifting rings and/or handles (or any other equivalent system) shall be provided on the ACS and be firmly attached to the enclosure or supporting framework.

Compliance is checked according to the test of 10.2.5.

8.2.1 Protection against mechanical impact (IK code)

Additional paragraph:

The ACS shall also withstand impacts of 6 joules energy representing collisions with site construction mechanical handling equipment (see IEC 60068-2-27).

For protection against mechanical impact refer to 10.2.6.

NOTE In addition to 8.2.1, It is possible to make reference also to the IK code in case the enclosure has been tested according to other IEC 61439 parts.

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

Replacement:

The degree of protection provided by an ACS against contact with live parts, ingress of solid foreign bodies and water is indicated by the IP code according to IEC 60529 and verified according to 10.3.

The degree of protection of the ACS shall be at least IP 44, with all doors closed and all removable panels and cover plates fitted.

Ventilation and drainage holes shall not reduce this degree of protection.

The degree of protection for an operating face inside a door shall be not less than IP 21 provided that the door can be closed under all conditions of use. Where the door cannot be closed the degree of protection for the operating face shall be at least IP 44.

Unless otherwise specified, the degree of protection indicated by the original manufacturer applies to the complete ACS, when it is installed in accordance with the original manufacturer's instructions.

Socket-outlets not protected by the enclosure of the ACS shall have a degree of protection at least equivalent to IP 44, both when the plug is removed or fully inserted.

Where the ACS does not have the same IP rating throughout, the original manufacturer shall declare in its technical documentation supplied with the ACS the IP rating for the separate parts. Example: IP 44, operating face IP 21.

No IP codes ~~may~~ can be given unless the appropriate verifications have been made according to 10.3.

8.4.3.1 Installation conditions

Replacement of the first two paragraphs:

The ACS shall include protective measures and be suitable for installations designed to be in accordance with IEC 60364-7-704:2017.

8.4.4 ~~Protection by total insulation~~ Additional requirements for class II assemblies

e) This item of IEC 61439-1:2020 is not applicable.

8.4.6.2 Requirements related to accessibility in service by authorized persons

This subclause of IEC 61439-1:2020 is not applicable.

8.5.3 Selection of switching devices and components

Additional paragraphs:

Plugs of different rated currents or voltages shall not be interchangeable, so as to avoid errors in connecting (see IEC 60309-1 and IEC 60309-2).

Connections for three-phase socket-outlets shall be made in such a way as to retain the same order of phases.

Additional subclause:

8.5.101 Accessible parts of ACS

Only the socket-outlets, operating handles and control buttons ~~may~~ can be accessible without the use of a key or tool. The actuator of the main switch shall be easily accessible (see 704.536.2.2 of IEC 60364-7-704:20052017).

8.8 Terminals for external ~~conductors~~ cables

Addition after the third paragraph:

All connections for external cables shall be re-wireable or shall be socket-outlets. Socket-outlets shall conform with the relevant standards and have a current rating of at least 16 A.

Additional subclauses:

8.101 Supports and securing devices of ACS

Every ACS shall be fitted with supports enabling it to stand on a horizontal surface (e.g. feet or legs, articulated or not) and/or a system for fixing it to a vertical wall, attached to the enclosure or supporting framework.

These various supports or securing devices shall be external to the enclosure but firmly attached to it. They shall be appropriate to the constructional features (weight, environment, etc.) and service characteristics of the ACS and shall be tested together with the ACS (Clause 10).

8.102 Cable outlet

The cable outlet shall be at a minimum distance from the ground compatible with the bending radius of the largest cable that ~~may~~ can be connected to the ACS.

Compliance is checked by inspection.

9 Performance requirements

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

9.3.2 Information concerning short-circuit withstand strength

The last two paragraphs of this subclause of IEC 61439-1:2020 are not applicable.

10 Design verification

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

10.2.1 General

Replacement of the second paragraph:

Where an empty enclosure in accordance with IEC 62208 is used, and it has not been modified so as to degrade the performance of the enclosure, no repetition of the enclosure testing to 10.2, with the exception of 10.2.6, is required unless the ACS is declared for heavily polluted atmosphere (see 7.2 item m).

Additional subclause:

10.2.2.101 Verification of the resistance to corrosion in a heavily polluted atmosphere

a) Principle

This test is intended to assess the corrosive effects of an industrial atmosphere, i.e. an atmosphere polluted with sulphur dioxide.

The complete and fully equipped ACS shall be continuously exposed to this atmosphere for ten days.

b) Method of test and test atmosphere

The complete and fully equipped ACS shall be tested in accordance with IEC 60068-2-42.

c) Results to be obtained

The ACS is declared satisfactory, if

- no trace of corrosion is found either inside or outside (except for the sharp edges) and;
- no damaging effect appears in the ACS, verified by applying the tests of 10.9.1 of IEC 61439-1:2020, between 24 h and 36 h after the ACS has been removed from the test chamber.

10.2.6 Verification of protection against mechanical impact (IK code)

Replacement of title and text.

10.2.6 Verification of mechanical strength

10.2.6.1 General

a) These tests shall be applied to the ACS, the test sample being in working order but disconnected from the sample supply.

The test sample shall be completely unpackaged.

b) The tests include two distinct procedures:

- impact test;
- shock test.

Tests shall be carried out at an ambient air temperature of $(20 \pm 5) ^\circ\text{C}$ after the ACS has been kept at this temperature for at least 12 h.

10.2.6.2 Impact test

a) Principle

The complete ACS (with all components mounted inside and fitted on suitable supports and securing devices (see 8.101) if these form part of the ACS) shall be subjected to a series of impacts of 6 J applied to the enclosure (not to the components inside it) (see 8.1.6).

b) Method of test

The equipment to be tested shall be fixed on a support of adequate rigidity to restrict movement of the ACS to 0,1 mm under the effect of the prescribed impact. Three successive impacts shall be applied to each face of the ACS under test by means of either:

- 1) a solid smooth steel sphere approximately 50 mm in diameter and with a mass of (500 ± 25) g, which shall be allowed to fall freely from rest through a vertical height of 1,2 m onto the enclosure surface held in a horizontal plane. The hardness of the sphere shall be not less than 50 HR and not more than 58 HR, or
- 2) a similar steel sphere, shall be suspended by a cord and swing as a pendulum in order to apply a horizontal impact, falling through a vertical distance of 1,2 m.

See Figure 101 for the test setup.

Sloping surfaces ~~may~~ can be tested using the pendulum but if this is not convenient the surface will be aligned in the horizontal plane by turning the unit on the support and the test 1) is used. Before each test an inspection of the sphere shall be made to ensure that it is free ~~of~~ from burrs and defects.

The test shall be so arranged that the impacts are applied at positions where weaknesses are most likely to be revealed. A total of 18 impacts shall be applied to the ACS.

The test is not applicable to components such as socket-outlets, operating handles, illuminating lights, pushbuttons, actuators, etc., when these components are mounted in recesses with respect to the main surfaces, so that the distance between the most exposed parts of these components and the said surfaces is at least 1 cm.

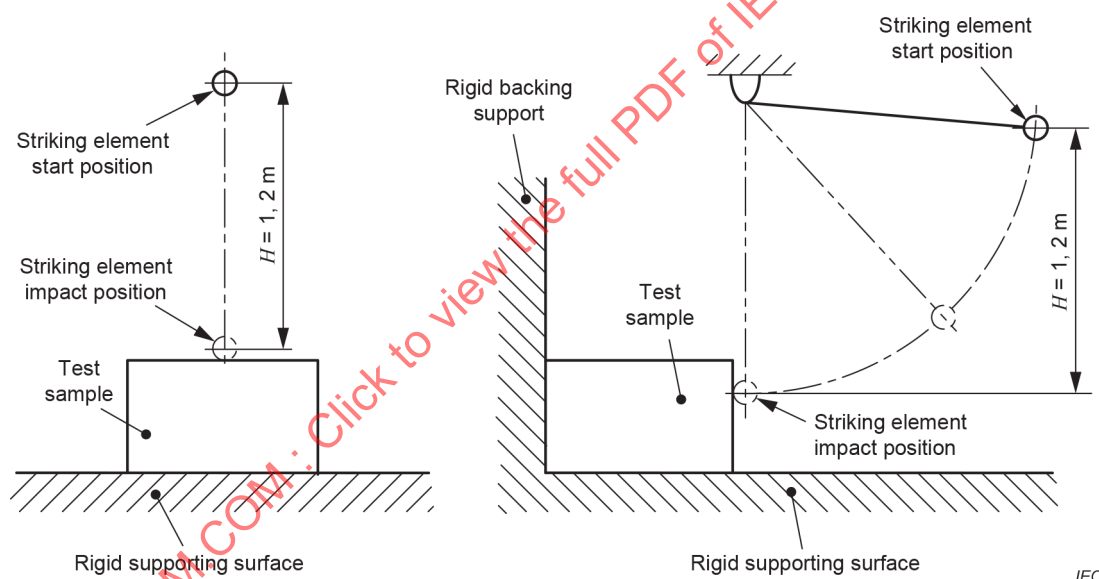


Figure 101 – Impact test using striking element

10.2.6.3 Shock test

a) Principle

The ACS shall be subjected to a single pulse half-sine wave, the shock test having a severity of 500 m/s^2 (50 g) peak acceleration and a duration of 11 ms.

b) Method of test

The ACS in working order shall be tested according to IEC 60068-2-27. Subject to agreement between manufacturer and user, the test ~~may~~ can be carried out at separate SECTIONS of the ACS.

10.2.6.4 Results to be obtained

After the test, the enclosure shall continue to provide the degrees of protection specified in 8.2.2; any distortions or deformations of the enclosure and components shall neither be

detrimental to the proper functioning of the ACS nor decrease creepage distances and clearances to below the required values; actuators, handles, etc., shall still be operable.

Distortion or deformation of plastic parts that can return in correct position by simple action (such as opening and reclosing of the cover) are not considered to be detrimental to the proper functioning of the ACS.

Superficial damage, paint removals, small indentations, cracks not visible with normal or corrected vision without further magnification, or surface cracks shall not constitute failure of the test.

10.9.3.1 General

Replacement of the first paragraph:

Verification shall be made by test.

10.10.1 General

Modification:

Item c) of this subclause of IEC 61439-1:2020 is not applicable.

10.10.4 Verification assessment

This subclause of IEC 61439-1:2020 is not applicable.

11 Routine verification

This clause of IEC 61439-1:2020 is applicable.

Additional clause:

101 Particular features of ACS

101.1 General requirements and functions

An ACS consists of one incoming unit and one or more outgoing units and ~~may~~ can incorporate METERING UNIT(s) and TRANSFORMER UNIT(s).

Outgoing unit(s) ~~may~~ can provide different functions such as: supply other ACS, lighting, machines or electric tools or other construction site equipment.

An ACS ~~may~~ can be intended to be interconnected to form an installation or part of an installation in the form of a series of ACS. Apart from all their characteristics, they are covered by the same rules for protection against electric shock and provide, if possible, selective protection by a suitable choice, for example of breaking capacity, current setting and operating time.

These various characteristics are laid down by the manufacturer or are the subject of an agreement between manufacturer and user taking into account the nature of supply and/or distribution network and relevant installation requirements.

According to the relevant installation standards IEC 60364 series SPDs should be considered to protect against overvoltages.

101.2 Incoming unit

The cable connection facilities (terminals, connecting devices, connectors or plug and socket-outlet accessory) shall be compatible with the current rating of the ACS.

An isolating device and an over-current protective device shall be provided.

There shall be means for securing the isolating device in the open position.

However, the over-current protective device ~~may~~ can be omitted if the ACS is adequately protected by an over-current protective device located in an upstream (supplying) ACS. In this case the assembly manufacturer shall provide the relevant information to the user for the correct choice of the upstream device.

According to IEC 60364-5-53, plug and socket-outlet arrangements ~~may~~ can be used as isolating devices.

101.3 Metering unit

The METERING UNIT ~~is to~~ shall be designed by or in agreement with the energy suppliers if it is intended to accept metering device(s) to measure the energy consumed for the purpose of payment of energy to the said suppliers.

METERING UNITS not intended for the purpose of payment of energy to the suppliers ~~need~~ are not ~~be~~ necessarily designed by or in agreement with those suppliers.

101.4 Transformer unit

101.4.1 General

This unit ~~may~~ can include a low-voltage/extra low-voltage (LV/ELV) transformer and/or low-voltage/low-voltage TRANSFORMER UNITS (LV/LV).

101.4.2 LV/ELV unit

This unit ~~may~~ can be either of the LV/SELV or of the LV/PELV type.

The requirements of ~~IEC 61140~~, IEC 60364-4-41:2005, Clause ~~441~~ 414 ~~and IEC/TS 61201~~ apply.

~~NOTE IEC/TR 61200-704 recommends the use of PELV only for heating concrete.~~

This type of unit essentially consists of:

- a) the protective and control devices in the primary circuit;
- b) the transformer, which shall be in accordance with IEC 61558-2-23;
- c) the protective and control devices for the output circuit(s).

101.4.3 LV/LV units

The requirements of IEC 60364-4-41:2005, Clause 413 apply.

Each LV/LV unit consists essentially of:

- a) the protective and control devices on the primary circuit;
- b) the LV/LV transformer, which shall be an isolating transformer in accordance with IEC 61558-2-23;
- c) the protective and control devices for the output circuit(s);

- d) the outlets, either terminals or socket-outlets. Socket-outlets shall be protected as required in 101.5 ~~de~~).

Notwithstanding item b), the transformer ~~need~~ shall not ~~to~~ be an isolating transformer if the neutral point is connected by a cable to an earthing terminal outside the enclosure. This cable shall be identified by a label placed inside the enclosure as close as possible to the terminal. Also in this case requirements a), c) and d) apply.

101.5 Outgoing units

Each unit consists of one or several outgoing circuits:

- a) There shall be means for isolation, load switching, over-current protection and for fault protection ~~against indirect contact~~. These functions ~~may~~ can be provided by one or more devices.
- b) The load switching device shall be easily accessible without the use of a key or tool in normal use.

NOTE 1 This means that an ACS ~~may~~ can have doors closed by key or tools for other purposes (e.g. closing at the end of working time) and they are opened during the normal use.

- c) The switching device shall operate simultaneously on all poles and involve all the phase conductors. For switching the neutral conductor, see IEC 60364-5-53:2004 ~~2019~~, Clause 536.
- d) The connection of the outgoing circuits ~~may~~ can made with socket outlets or by terminals for direct connection.

- e) ~~socket outlets shall be protected:~~

~~— against direct contact or indirect contact according to IEC 60364-7-704:2005, Clause 704-4;~~

~~Where RCD's are used as means of protection, one RCD may protect several socket-outlets. However, consideration should be given to the effects of unintended tripping e.g. when the RCD protects more than 6 socket outlet.~~

~~Where RCD are used consideration should be given to the nature of the load e.g. the presence of high frequency and/or d.c. components.~~

~~— against overcurrent with protective devices with a rated current not exceeding the rated current of the socket outlet. A protective device may protect more than one socket outlet (not applicable to IT systems).~~

~~Consideration should be given to effects of unintended tripping e.g. when an overcurrent protective device protects more than one socket outlet.~~

Circuits supplying socket-outlets shall be provided with provisions to ensure:

- basic protection or fault protection according to IEC 60364-7-704:2017.

Where RCD's are used, the same RCD can protect several socket-outlets. However, consideration should be given to the effects of unintended tripping e.g. when the RCD protects more than 6 socket outlet;

- the protection against overcurrent with protective devices with a rated current not exceeding the rated current of the socket-outlet. A protective device can protect more than one socket-outlet (not applicable to IT systems).

Consideration should be given to effects of unintended tripping e.g. when an overcurrent protective device protects more than one socket outlet.

NOTE 2 Measures for unwanted tripping are given in Clause 531 of IEC 60364-5-53:2019 and IEC 60364-5-53:2019/AMD1:2020

Addition:

Table 101 – Values of assumed loading

Type of load	Assumed loading factor
Distribution – 2 and 3 circuits	0,9
Distribution – 4 and 5 circuits	0,8
Distribution – 6 to 9 circuits	0,7
Distribution – 10 or more circuits	0,6

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Annexes

The annexes of IEC 61439-1:2020 are applicable except as follows:

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Annex C (informative)

User information template

~~This annex of Part 1 is not applicable.~~

Table C.1 is intended as a template for the identification of items necessary for the assembly manufacturer which is provided by the user.

It is intended to be used and developed in the relevant assembly standards.

**Table C.1 – Items subject to agreement between
the assembly manufacturer and the user**

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Electrical system				
Earthing system	5.6, 8.4.3.1, 8.4.3.2.3, 8.6.2, 10.5, 11.4	Manufacturer's standard, selected to suit local requirements	TT / TN-C / TN-C-S / IT, TN-S	
Nominal voltage (V)	3.8.9.1, 5.2.1, 8.5.3	Local, according to installation conditions	max 1 000 V AC or 1 500 V DC	
Transient overvoltages	5.2.4, 8.5.3, 9.1	Determined by the electrical system	Overvoltage category I / II / III / IV	
Temporary overvoltages	9.1	Nominal system voltage + 1 200 V	None	
Rated frequency f_n (Hz)	3.8.12, 5.5, 8.5.3, 10.10.2.3, 10.11.5.4	According to local installation conditions	DC/50 Hz/60 Hz	
Additional on-site testing requirements: wiring, operational performance and function	11.10	Manufacturer's standard, according to application	None	
Short-circuit withstand capability				
Prospective short-circuit current at supply terminals I_{cp} (kA)	3.8.7	Determined by the electrical system	None	
Prospective short-circuit current in the neutral	10.11.5.3.5	Max. 60 % of phase values	None	
Prospective short-circuit current in the protective circuit	10.11.5.6	Max. 60 % of phase values	None	
SCPD in the incoming functional unit requirement	9.3.2	According to local installation conditions	Yes / No	
Co-ordination of short-circuit protective devices including external short-circuit protective device details	9.3.4	According to local installation conditions	None	
Data associated with loads likely to contribute to the short-circuit current	9.3.2	No loads likely to make a significant contribution allowed for	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Protection of persons against electric shock in accordance with IEC 60364-4-41				
Type of protection against electric shock – Basic protection	8.4.2	Basic protection	According to local installation regulations	
Type of protection against electric shock – Fault protection	8.4.3	According to local installation conditions	Automatic disconnection of supply / Electrical separation / Total insulation	
Installation environment				
Location type	3.5, 8.1.4, 8.2	Manufacturer's standard, according to application	None	
Protection against ingress of solid foreign bodies and ingress of water	8.2.2, 8.2.3	IP 44 minimum	None	
Mechanical strength	8.1.5, 10.2.6	50 g 11 ms	None	
Protection against mechanical impact	8.2.1, 10.2.6	6 J		
Resistance to UV radiation	10.2.4	Temperate climate	None	
Resistance to corrosion	7.1, 7.2, 10.2.2	Normal service conditions and/or Special service condition	normal service conditions special service condition	
Ambient air temperature – Lower limit	7.1.1	–25 °C	None	
Ambient air temperature – Upper limit	7.1.1	40 °C	None	
Ambient air temperature – Daily average maximum	7.1.1, 9.2	35 °C	None	
Maximum relative humidity	7.1.2	100 % at 25 °C	None	
Pollution degree (of the installation environment)	7.1.2	3	3 and 4	
Altitude	7.1.1	≤ 2 000 m	None	
EMC environment (A or B)	9.4, 10.12, Annex J	A/B	A/B	
Special service conditions (e.g. vibration, exceptional condensation, strong electric or magnetic fields, fungus, small creatures, explosion hazards, heavy vibration and shocks, earthquakes)	7.2, 8.5.4, 9.3.3 Table 7	No special service conditions	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Installation method				
Transportable (semi-fixed)/mobile	3.5.101 3.5.102	Transportable (semi-fixed), mobile	Transportable (semi-fixed), mobile	
Maximum overall dimensions and weight	5.6, 6.2.1	Manufacturer's standard, according to application	None	
External conductor type(s)	8.8	Manufacturer's standard	Cable / BUSBAR Trunking System	
Direction(s) of external conductors	8.8	Manufacturer's standard	None	
External conductor material	8.8	Copper	Copper / aluminium	
External phase conductor, cross SECTIONS, and terminations	8.8	As defined within the standard	None	
External PE, N, PEN conductor's cross SECTIONS, and terminations	8.8	As defined within the standard	None	
Special terminal identification requirements	8.8	Manufacturer's standard	None	
Storage and handling				
Maximum dimensions and weight of transport units	6.2.2, 10.2.5	Manufacturer's standard	None	
Methods of transport (e.g. forklift, crane)	6.2.2, 8.1.6	Manufacturer's standard	None	
Environmental conditions different from the service conditions	7.3	As service conditions	None	
Packing details	6.2.2	Manufacturer's standard	None	
Operating arrangements				
Access to manually operated devices	8.4.6	Ordinary persons	None	
Location of manually operated devices	8.5.5	Easily accessible	None	
Isolation of load installation equipment items	8.4.2, 8.4.3.3	Manufacturer's standard	Individual / groups / all	
Maintenance and upgrade capabilities				
Requirements related to accessibility in service by ordinary persons; requirement to operate devices or change components while the ACS is energised	8.4.6.1	Basic protection	None	
Method of functional units connection	8.5.1, 8.5.2	Manufacturer's standard	None	
Provisions for basic protection with hazardous live internal parts during maintenance or upgrade (e.g. functional units, main BUSBARS, distribution BUSBARS)	8.4	No requirements for protection during maintenance or upgrade	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Current carrying capability				
Rated current of the ACS I_{nA} (A)	3.8.9.1, 5.3, 8.4.3.2.3, 8.5.3, 8.8, 10.10.2, 10.10.3, 10.11.5, Annex E	Manufacturer's standard, according to application	None	
Rated current of circuits I_{nc} (A)	5.3.2	Manufacturer's standard, according to application	None	
Rated diversity factor	5.4, 10.10.2.3, Annex E	As defined within the standard	RDF for groups of circuits / RDF for whole ACS	
Ratio of cross SECTION of the neutral conductor to phase conductors: phase conductors up to and including 16 mm ²	8.6.1	100 %	None	
Ratio of cross SECTION of the neutral conductor to phase conductors: phase conductors above 16 mm ²	8.6.1	50 % (min. 16 mm ²)	None	
^a For exceptionally onerous applications, more stringent requirements to those in the standard can apply. ^b In some cases information declared by the assembly manufacturer can take the place of an agreement.				

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Annex D (informative)

Design verification

Table D.1 – List of design verifications to be performed

Replacement of table:

No.	Characteristic to be verified	Clauses or subclauses	Verification options available		
			Testing	Comparison with a reference design	Assessment
1	Strength of material and parts:	10.2			
	Resistance to corrosion	10.2.2	YES	NO	NO
	Properties of insulating materials:	10.2.3			
	Thermal stability	10.2.3.1	YES	NO	NO
	Resistance to abnormal heat and fire due to internal electric effects	10.2.3.2	YES	NO	NO
	Resistance to ultra-violet (UV) radiation	10.2.4	YES	NO	NO
	Lifting	10.2.5	YES	NO	NO
	Mechanical impact	10.2.6	YES	NO	NO
	Marking	10.2.7	YES	NO	NO
	Mechanical operation	10.2.8	YES	NO	NO
2	Degree of protection of enclosures	10.3	YES	NO	YES
3	Clearances	10.4	YES	NO	YES
4	Creepage distances	10.4	YES	NO	NO
5	Protection against electric shock and integrity of protective circuits:	10.5			
	Effective continuity between the exposed conductive parts of the ACS and the protective circuit	10.5.2	YES	NO	NO
	Short-circuit withstand strength of the protective circuit	10.5.3	YES	YES	YES
6	Incorporation of switching devices and components	10.6	NO	NO	YES
7	Internal electrical circuits and connections	10.7	NO	NO	YES
8	Terminals for external conductors	10.8	NO	NO	YES
9	Dielectric properties:	10.9			
	Power-frequency withstand voltage	10.9.2	YES	NO	NO
	Impulse withstand voltage	10.9.3	YES	NO	NO
	Enclosures made of insulating material	10.9.4	YES	NO	NO
	External operation handles of insulating material	10.9.5	YES	NO	NO
	Conductors covered by insulating material to provide protection against electric shock	10.9.6	YES	NO	NO
10	Temperature-rise limits	10.10	YES	YES	NO
11	Short-circuit withstand strength	10.11	YES	YES	NO
12	Electromagnetic compatibility (EMC)	10.12	YES	NO	YES
13	Mechanical operation	10.13	YES	NO	NO

Annex ~~O~~ L (informative)

Guidance on ~~verification~~ of temperature-rise-~~verification~~

Modifications:

~~O~~L.2 Temperature-rise limits

The first paragraph of this clause of IEC 61439-1:2020 is not applicable.

~~O.4~~ — Calculation

L.4 Verification assessment

This clause of IEC 61439-1:2020 is not applicable.

~~O.5~~ — Design rules

L.5 Verification by comparison with a reference design

This clause of IEC 61439-1:2020 is not applicable.

Figure ~~O~~L.1 – ~~Temperature~~ Verification of temperature-rise-~~verification~~ methods

This figure of IEC 61439-1:2020 is not applicable.

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Annex ~~P~~ M
(normative)

**Verification of the short-circuit withstand strength of BUSBAR structures
by comparison with a ~~tested~~ reference design by calculation**

This annex of IEC 61439-1:2020 is not applicable.

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Annex ~~AA~~ N (informative)

List of notes concerning certain countries

Subclause	Text
6.1	Add the following note after the last paragraph: NOTE In Norway, assemblies are additionally marked with the minimum ambient temperature applicable for the ACS.
7.1.1.2	Add the following note after the last paragraph: NOTE In Norway, assemblies suitable for normal operation at a lower ambient temperature than -25 °C also comply with the requirements of this publication.
8.2.2	Add the following note after the first paragraph: NOTE 1 In the United States of America (USA), Canada and in Mexico enclosure “type” designations are used to specify “the degree of protection” provided to the ACS. For applications in the USA, the appropriate enclosure type designation should be used as specified in NEMA 250. For applications in Canada, the appropriate enclosure type designation should be used as specified in CSA standard C22.2 No. 94.1 and 94.2. For applications in Mexico, the appropriate enclosure Type designation should be used as specified in NMX-J-235/1-ANCE and NMX-J-235/2-ANCE. Add the following note after the third paragraph of this subclause: NOTE 2 In Spain wiring rules (RD 842/2002) require a minimum degree of protection of IP 45 for enclosures, switchgear and controlgear, socket-outlets and other installation elements intended for outdoor construction sites.
8.8	Add the following note after the last paragraph: NOTE In Australia and New Zealand socket outlets for industrial use with lower current are used.
10.2.6.1	Add the following notes at the end of this subclause: NOTE 1 In Sweden National codes and regulations require a minimum operating temperature of -25 °C. NOTE 2 In Norway, the test is carried out at an ambient temperature (20±5) °C immediately after the assembly has been kept at a temperature corresponding to the minimum ambient temperature specified for the ACS, for a period of not less than 12 h.

~~Annex BB~~

~~(Void)~~

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Annex CC (informative)

Items subject to agreement between the ASSEMBLY manufacturer and the user

The following information is subject to an agreement between the ASSEMBLY manufacturer and the user. In some cases, information declared by the ASSEMBLY manufacturer may take the place of an agreement.

**Table CC.1 – Items subject to agreement between
the ASSEMBLY manufacturer and the user**

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Electrical system				
Earthing system	5.6, 8.4.3.1, 8.4.3.2.3, 8.6.2, 10.5, 11.4	Manufacturer's standard, selected to suit local requirements	TT / TN-C / TN-C-S / IT, TN-S	
Nominal voltage (V)	3.8.9.1, 5.2.1, 8.5.3	Local, according to installation conditions	max 1 000 V a.c. or 1 500 V d.c.	
Transient overvoltages	5.2.4, 8.5.3, 9.1	Determined by the electrical system	Overvoltage category I / II / III / IV	
Temporary overvoltages	9.1	Nominal system voltage + 1 200 V	None	
Rated frequency f_n (Hz)	3.8.12, 5.5, 8.5.3, 10.10.2.3, 10.11.5.4	According to local installation conditions	d.c./50 Hz/60 Hz	
Additional on-site testing requirements: wiring, operational performance and function	11.10	Manufacturer's standard, according to application	None	
Short-circuit withstand capability				
Prospective short-circuit current at supply terminals I_{sc} (kA)	3.8.7	Determined by the electrical system	None	
Prospective short-circuit current in the neutral	10.11.5.3.5	Max. 60 % of phase values	None	
Prospective short-circuit current in the protective circuit	10.11.5.6	Max. 60 % of phase values	None	
SCPD in the incoming functional unit requirement	9.3.2	According to local installation conditions	Yes / No	
Co-ordination of short-circuit protective devices including external short-circuit protective device details	9.3.4	According to local installation conditions	None	
Data associated with loads likely to contribute to the short-circuit current	9.3.2	No loads likely to make a significant contribution allowed for	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Protection of persons against electric shock in accordance with IEC 60364-4-41				
Type of protection against electric shock — Basic protection (protection against direct contact)	8.4.2	Basic protection	According to local installation regulations	
Type of protection against electric shock — Fault protection (protection against indirect contact)	8.4.3	According to local installation conditions	Automatic disconnection of supply / Electrical separation / Total insulation	
Installation environment				
Location type	3.5, 8.1.4, 8.2	Manufacturer's standard, according to application	None	
Protection against ingress of solid foreign bodies and ingress of water	8.2.2, 8.2.3	IP 44 minimum	None	
Mechanical strength	8.1.5, 10.2.6	50 g 11 ms	None	
Protection against mechanical impact	8.2.1, 10.2.6	6 J		
Resistance to UV radiation	10.2.4	Temperate climate	None	
Resistance to corrosion	7.1, 7.2, 10.2.2	Normal service conditions and/or Special service condition	normal service conditions special service condition	
Ambient air temperature — Lower limit	7.1.1	–25 °C	None	
Ambient air temperature — Upper limit	7.1.1	40 °C	None	
Ambient air temperature — Daily average maximum	7.1.1, 9.2	35 °C	None	
Maximum relative humidity	7.1.2	100 % at 25 °C	None	
Pollution degree (of the installation environment)	7.1.3	3 or 4	None	
Altitude	7.1.4	≤ 2 000 m	None	
EMC environment (A or B)	9.4, 10.12, Annex J	A/B	A/B	
Special service conditions (e.g. vibration, exceptional condensation, strong electric or magnetic fields, fungus, small creatures, explosion hazards, heavy vibration and shocks, earthquakes)	7.2, 8.5.4, 9.3.3 Table 7	No special service conditions	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Installation method				
Transportable (semi-fixed)/mobile	3.5	Transportable (semi-fixed); mobile	Transportable (semi-fixed); mobile	
Maximum overall dimensions and weight	5.6, 6.2.1	Manufacturer's standard; according to application	None	
External conductor type(s)	8.8	Manufacturer's standard	Cable / Busbar Trunking System	
Direction(s) of external conductors	8.8	Manufacturer's standard	None	
External conductor material	8.8	Copper	Copper/ aluminium	
External phase conductor, cross sections, and terminations	8.8	As defined within the standard;	None	
External PE, N, PEN conductors cross sections, and terminations	8.8	As defined within the standard;	None	
Special terminal identification requirements	8.8	Manufacturer's standard	None	
Storage and handling				
Maximum dimensions and weight of transport units	6.2.2, 10.2.5	Manufacturer's standard	None	
Methods of transport (e.g. forklift, crane)	6.2.2, 8.1.6	Manufacturer's standard	None	
Environmental conditions different from the service conditions	7.3	As service conditions	None	
Packing details	6.2.2	Manufacturer's standard	None	
Operating arrangements				
Access to manually operated devices	8.4.6	Ordinary persons	None	
Location of manually operated devices	8.5.5	Easily accessible	None	
Isolation of load installation equipment items	8.4.2, 8.4.3.3	Manufacturer's standard	Individual / groups / all	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Maintenance and upgrade capabilities				
Requirements related to accessibility in service by ordinary persons; requirement to operate devices or change components while the ACS is energised	8.4.6.1	Basic protection	None	
Method of functional units connection	8.5.1, 8.5.2	Manufacturer's standard	None	
Protection against direct contact with hazardous live internal parts during maintenance or upgrade (e.g. functional units, main busbars, distribution busbars)	8.4	No requirements for protection during maintenance or upgrade	None	
Current carrying capability				
Rated current of the ACS I_{NA} (A)	3.8.9.1, 5.3, 8.4.3.2.3, 8.5.3, 8.8, 10.10.2, 10.10.3, 10.11.5, Annex E	Manufacturer's standard, according to application	None	
Rated current of circuits I_{NC} (A)	5.3.2	Manufacturer's standard, according to application	None	
Rated diversity factor	5.4, 10.10.2.3, Annex E	As defined within the standard	RDF for groups of circuits / RDF for whole ACS	
Ratio of cross section of the neutral conductor to phase conductors: phase conductors up to and including 16 mm ²	8.6.1	100 %	None	
Ratio of cross section of the neutral conductor to phase conductors: phase conductors above 16 mm ²	8.6.1	50 % (min. 16 mm ²)	None	
a — For exceptionally onerous applications, the user may need to specify more stringent requirements to those in the standard. b — In some cases information declared by the ASSEMBLY manufacturer may take the place of an agreement.				

Bibliography

The bibliography of IEC 61439-1:2020 is applicable except as follows.

Addition:

IEC 60309-1, *Plugs, fixed or portable socket-outlets and ~~couplers~~ appliances inlets for industrial purposes – Part 1: General requirements*

IEC 60309-2, *Plugs, fixed or portable socket-outlets and ~~couplers~~ appliance inlets for industrial purposes – Part 2: Dimensional ~~interchangeability~~ compatibility requirements for pin and contact-tube accessories*

IEC 60364 (all parts), *Electrical installations of buildings*

IEC 60364-5-53:2001/2019, ~~Electrical installation of buildings~~ *Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Devices for protection for safety, isolation, switching, control and monitoring*
IEC 60364-5-53:2019/AMD1:2020

IEC 61140:2016, *Protection against electric shock – Common aspects for installation and equipment*

IEC TR 61200-704:1996, *Electrical installation guide – Part 704: Construction and demolition site installations*¹

IEC TR 61439-0, *Low-voltage switchgear and controlgear assemblies – Part 0: Guidance to specifying assemblies*

¹ This publication was withdrawn.

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Low-voltage switchgear and controlgear assemblies –
Part 4: Particular requirements for assemblies for construction sites (ACS)**

**Ensembles d'appareillage à basse tension –
Partie 4: Exigences particulières pour ensembles de chantiers (EC)**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**LOW-VOLTAGE SWITCHGEAR AND
CONTROLGEAR ASSEMBLIES –****Part 4: Particular requirements for assemblies
for construction sites (ACS)****FOREWORD**

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IEC 61439-4 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 of IEC 61439-4 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 IEC 61439-1:2020 regarding the structure and technical content, as applicable.

The text of this document is based on the following documents:

Draft	Report on voting
121B/183/FDIS	121B/188/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 61439-1:2020 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.

In this document, terms written in small capitals are defined in Clause 3.

The reader’s attention is drawn to the fact that Annex N 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.

LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

Part 4: Particular requirements for assemblies for construction sites (ACS)

1 Scope

NOTE Throughout this document, the abbreviation ACS (assembly for construction site, see 3.1.101) is used for a low-voltage switchgear and controlgear assembly intended for use on construction and similar sites.

This document defines the specific requirements of ACS as follows:

- assemblies for which the rated voltage does not exceed 1 000 V in case of AC or 1 500 V in case of DC;
- assemblies where the nominal primary voltage and the nominal secondary voltage of transformers incorporated in ACS are within the limits specified above;
- assemblies intended for use on construction sites, both indoors and outdoors, i.e. temporary places of work to which the public do not generally have access and where building construction, installation, repairs, alteration or demolition of property (buildings) or civil engineering (public works) or excavation or any other similar operations are carried out;
- transportable (semi-fixed) or MOBILE assemblies with enclosure.

The manufacture and/or assembly can be carried out by an entity 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 will comply with the relevant product standards.

This document does not apply to assemblies for use in the administrative centres of construction sites (offices, cloakrooms, meeting rooms, canteens, restaurants, dormitories, toilets, etc.).

Requirements for electrical protection provided by equipment manufactured according to this document are given in IEC 60364-7-704.

2 Normative references

This clause of IEC 61439-1:2020 is applicable except as follows:

Addition:

IEC 60068-2-27, *Environmental testing – Part 2-27: Tests – Test Ea and guidance: Shock*

IEC 60068-2-42, *Environmental testing – Part 2-42: Tests – Test Kc: Sulphur dioxide test for contacts and connections*

IEC 60364-7-704:2017, *Low-voltage electrical installations – Part 7-704: Requirements for special installations or locations – Construction and demolition site installations*

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

IEC 61558-2-23, *Safety of transformers, reactors, power supply units and combinations thereof – Part 2-23: Particular requirements and tests for transformers and power supply units for construction sites*

3 Terms and definitions

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

Additional terms and definitions:

3.1 General terms

3.1.101

low-voltage switchgear and controlgear assembly for construction sites ACS

combination of one or several transforming or low voltage switching devices with associated control, measuring, signalling, protective and regulating equipment complete with all their internal electrical and mechanical connections and structural parts, designed and built for use on all construction sites, indoors and outdoors

3.2 Constructional units of assemblies

3.2.101

metering unit

functional unit equipped with apparatus for metering electrical energy

3.2.102

transformer unit

functional unit consisting mainly of one or several transformers

Modifications:

3.3 External design of assemblies

3.3.1

open-type assembly

This term of IEC 61439-1:2020 does not apply.

3.3.2

dead-front assembly

This term of IEC 61439-1:2020 does not apply.

Replacement:

3.3.3

enclosed ACS

ACS which is enclosed on all sides with the possible exception of its mounting surface in such a manner as to provide a defined degree of protection

3.3.7

box-type ACS

ENCLOSED ACS intended:

- either to be mounted on a vertical surface;
- or to stand on a horizontal surface supported by feet or legs (articulated or not) or by a mounting not forming part of the ACS (see 3.4.2 of IEC 61439-1:2020)

Modification:

3.5 Conditions of installation of assemblies

3.5.1

assembly for indoor installation

This term of IEC 61439-1:2020 does not apply (see 3.1.101).

3.5.2

assembly for outdoor installation

This term of IEC 61439-1:2020 does not apply (see 3.1.101).

3.5.3

stationary assembly

This term of IEC 61439-1:2020 does not apply.

3.5.4

movable assembly

This term of IEC 61439-1:2020 does not apply.

Additional terms and definitions:

3.5.101

transportable ACS

semi-fixed ACS

ACS intended for use in a place where it is not permanently fixed

Note 1 to entry: The location of a TRANSPORTABLE ACS can vary during work on the same site. When the equipment is moved to another place, it is first disconnected from the supply.

3.5.102

mobile ACS

ACS capable of being moved as work advances on the site, without being disconnected from the supply

Additional terms and definitions:

3.101 Function of the ACS

3.101.1

incoming supply function

suitability for connection of the ACS either to electricity public supply network or to the transformer substation or to on site generator

3.101.2

metering function

suitability for the metering of electrical energy consumed on the site

3.101.3

distribution function

suitability to provide the distribution and protection of electrical supply on the construction site by means of terminal connection or socket-outlets

3.101.4

transformer function

suitability to provide means for transformer voltages or to provide measures of electrical protection

Note 1 to entry: Details for their requirements are given in 101.1.

4 Symbols and abbreviations

This clause of IEC 61439-1:2020 is applicable.

5 Interface characteristics

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

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

Replacement of title and text:

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

The rated current of an ACS is **group rated current** I_{ng} of its incoming circuit.

This current shall be carried without the temperature rise of the individual parts exceeding the limits specified in 9.2 of IEC 61439-1:2020.

5.4 Rated diversity factor (RDF)

Addition:

The assumed loading of the outgoing circuits of the ACS or group of outgoing circuits shall be declared by the assembly manufacturer and can be based on the values in Table 101.

When the manufacturer does not declare any RDF, the values of Table 101 apply.

5.6 Other characteristics

Replacement:

The following characteristics shall be declared:

- the function(s) assigned by the manufacturer (see 3.101);
- the external design (see 3.3);
- the mobility (see 3.5.101 and 3.5.102);
- the degree of protection (see 8.2);
- the method of mounting, for example fixed or removable parts (see 8.5.1 and 8.5.2);
- protection against electric shock (see 8.4);
- the resistance to corrosion (see 10.2.2.101);
- special service conditions, if applicable (see 7.2);
- electromagnetic compatibility (EMC) classification (see Annex J of IEC 61439-1:2020).

6 Information

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

6.1 Assembly designation marking

Replacement of title and text:

6.1 ACS designation marking

The assembly manufacturer shall provide each ACS with one or more labels, marked in a durable manner and located in a place such that they are visible and legible when the ACS is installed and in operation.

Compliance is checked according to the test of 10.2.7 and by inspection.

The following information regarding the ACS shall be provided on the label(s):

- a) assembly manufacturer's name or trade mark (see 3.10.2);
- b) type designation or identification number or any other means of identification, making it possible to obtain relevant information from the assembly manufacturer;
- c) means of identifying date of manufacture;
- d) IEC 61439-4;
- e) type of current (and the frequency in the case of AC);
- f) rated voltage (U_n) (of the ACS) (see 5.2.1);
- g) rated current of the ACS (I_{nA}) (see 5.3.1);
- h) degree of protection (see 8.2);
- i) the weight where this exceeds 30 kg;

If the indication of the name or trademark of the manufacturer appears on the ACS, it shall not be given on the nameplate.

6.2.1 Information relating to the assembly

Replacement of title and text:

6.2.1 Information relating to the ACS

The following additional information, where applicable, shall be provided in the assembly manufacturer's technical documentation supplied with the ACS:

- a) rated operational voltage (U_e) (of a circuit) (see 5.2.2);
- b) rated impulse withstand voltage (U_{imp}) (see 5.2.4);
- c) rated insulation voltage (U_i) (see 5.2.3);
- d) rated current of each circuit (I_{nc}) (see 5.3.2);
- e) rated peak withstand current (I_{pk}) (see 5.3.4);
- f) rated short-time withstand current (I_{cw}) together with its duration (see 5.3.4);
- g) rated conditional short-circuit current (I_{cc}) (see 5.3.5);
- h) rated frequency (f_n) (see 5.5);
- i) rated diversity factor(s) (RDF) (see 5.4);
- j) functions (see 3.101);

- k) all necessary information relating to the other declared classifications and characteristics (see 5.6);
- l) the short-circuit withstand strength and characteristics of short-circuit protective device(s) (see 9.3.2);
- m) overall dimensions (including projections e.g handles, covers, doors).

6.2.2 Instructions for handling, installation, operation and maintenance

Addition:

The manufacturer of the ACS should specify in its technical documentation supplied with the ACS the other types of assemblies which can be connected to it. This information should indicate whether the compatibility is based upon the type of system earthing employed and/or on the need for co-ordination of the electrical protection within the complete installation.

The manufacturer should furnish the appropriate documentation for the purpose to maintain the protective measures and the co-ordination of the protective devices within the complete installation.

7 Service conditions

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

Modifications:

7.1.2 Pollution degree

Replacement of the last paragraph with:

Only pollution degrees 3 and 4 are applicable.

The microenvironment can be reduced to pollution degree 2 if the degree of protection of the enclosure is at least IP5X and care is taken to avoid condensation.

7.2 Special service conditions

Addition of the following new item:

- n) heavily polluted atmosphere.

8 Constructional requirements

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

8.1.1 General

Addition:

All the apparatus shall be placed inside the enclosure fitted with such removable panels, cover plates or doors as applicable for connection or maintenance with the possible exception of the items mentioned in 8.101 provided that they withstand the service conditions of Clause 7 and the requirements of 8.1.2 and 8.1.6.

8.1.2 Protection against corrosion

Replacement:

Protection against corrosion shall be ensured by the use of suitable materials or by protective coatings to the exposed surface taking account of the normal service conditions (see 7.1) and/or special service condition (see 7.2). Compliance to this requirement is checked by the test of 10.2.2.

8.1.4 Resistance to ultra-violet (UV) radiation

Replacement:

For enclosures and external parts made of insulating materials, resistance to ultra-violet radiation shall be verified according to 10.2.4.

For external parts made of insulating material of components covered by other IEC standard (for examples socket-outlets, handles of switch, push buttons, etc.), this test is not required.

8.1.5 Mechanical strength

Addition:

The ACS shall be constructed to withstand mechanical shocks having an acceleration of 500 m/s^2 , a pulse shape of a half-sine wave of 11 ms duration (commensurate with equipment being carried loose in normal road or rail vehicles for long periods).

Compliance is verified according to 10.2.6.

8.1.6 Lifting provision

Replacement:

Lifting rings and/or handles (or any other equivalent system) shall be provided on the ACS and be firmly attached to the enclosure or supporting framework.

Compliance is checked according to the test of 10.2.5.

8.2.1 Protection against mechanical impact (IK code)

Additional paragraph:

The ACS shall also withstand impacts of 6 joules energy representing collisions with site construction mechanical handling equipment (see IEC 60068-2-27).

For protection against mechanical impact refer to 10.2.6.

NOTE In addition to 8.2.1, It is possible to make reference also to the IK code in case the enclosure has been tested according to other IEC 61439 parts.

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

Replacement:

The degree of protection provided by an ACS against contact with live parts, ingress of solid foreign bodies and water is indicated by the IP code according to IEC 60529 and verified according to 10.3.

The degree of protection of the ACS shall be at least IP 44, with all doors closed and all removable panels and cover plates fitted.

Ventilation and drainage holes shall not reduce this degree of protection.

The degree of protection for an operating face inside a door shall be not less than IP 21 provided that the door can be closed under all conditions of use. Where the door cannot be closed the degree of protection for the operating face shall be at least IP 44.

Unless otherwise specified, the degree of protection indicated by the original manufacturer applies to the complete ACS, when it is installed in accordance with the original manufacturer's instructions.

Socket-outlets not protected by the enclosure of the ACS shall have a degree of protection at least equivalent to IP 44, both when the plug is removed or fully inserted.

Where the ACS does not have the same IP rating throughout, the original manufacturer shall declare in its technical documentation supplied with the ACS the IP rating for the separate parts. Example: IP 44, operating face IP 21.

No IP codes can be given unless the appropriate verifications have been made according to 10.3.

8.4.3.1 Installation conditions

Replacement of the first two paragraphs:

The ACS shall include protective measures and be suitable for installations designed to be in accordance with IEC 60364-7-704:2017.

8.4.4 Additional requirements for class II assemblies

e) This item of IEC 61439-1:2020 is not applicable.

8.4.6.2 Requirements related to accessibility in service by authorized persons

This subclause of IEC 61439-1:2020 is not applicable.

8.5.3 Selection of switching devices and components

Additional paragraphs:

Plugs of different rated currents or voltages shall not be interchangeable, so as to avoid errors in connecting (see IEC 60309-1 and IEC 60309-2).

Connections for three-phase socket-outlets shall be made in such a way as to retain the same order of phases.

Additional subclause:

8.5.101 Accessible parts of ACS

Only the socket-outlets, operating handles and control buttons can be accessible without the use of a key or tool. The actuator of the main switch shall be easily accessible (see 704.536.2.2 of IEC 60364-7-704:2017).

8.8 Terminals for external cables

Addition after the third paragraph:

All connections for external cables shall be re-wireable or shall be socket-outlets. Socket-outlets shall conform with the relevant standards and have a current rating of at least 16 A.

Additional subclauses:

8.101 Supports and securing devices of ACS

Every ACS shall be fitted with supports enabling it to stand on a horizontal surface (e.g. feet or legs, articulated or not) and/or a system for fixing it to a vertical wall, attached to the enclosure or supporting framework.

These various supports or securing devices shall be external to the enclosure but firmly attached to it. They shall be appropriate to the constructional features (weight, environment, etc.) and service characteristics of the ACS and shall be tested together with the ACS (Clause 10).

8.102 Cable outlet

The cable outlet shall be at a minimum distance from the ground compatible with the bending radius of the largest cable that can be connected to the ACS.

Compliance is checked by inspection.

9 Performance requirements

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

9.3.2 Information concerning short-circuit withstand strength

The last two paragraphs of this subclause of IEC 61439-1:2020 are not applicable.

10 Design verification

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

10.2.1 General

Replacement of the second paragraph:

Where an empty enclosure in accordance with IEC 62208 is used, and it has not been modified so as to degrade the performance of the enclosure, no repetition of the enclosure testing to 10.2, with the exception of 10.2.6, is required unless the ACS is declared for heavily polluted atmosphere (see 7.2 item m).

Additional subclause:

10.2.2.101 Verification of the resistance to corrosion in a heavily polluted atmosphere

a) Principle

This test is intended to assess the corrosive effects of an industrial atmosphere, i.e. an atmosphere polluted with sulphur dioxide.

The complete and fully equipped ACS shall be continuously exposed to this atmosphere for ten days.

b) Method of test and test atmosphere

The complete and fully equipped ACS shall be tested in accordance with IEC 60068-2-42.

c) Results to be obtained

The ACS is declared satisfactory, if

- no trace of corrosion is found either inside or outside (except for the sharp edges) and;
- no damaging effect appears in the ACS, verified by applying the tests of 10.9.1 of IEC 61439-1:2020, between 24 h and 36 h after the ACS has been removed from the test chamber.

10.2.6 Verification of protection against mechanical impact (IK code)

Replacement of title and text:

10.2.6 Verification of mechanical strength

10.2.6.1 General

- a) These tests shall be applied to the ACS, the test sample being in working order but disconnected from the sample supply.

The test sample shall be completely unpackaged.

- b) The tests include two distinct procedures:

- impact test;
- shock test.

Tests shall be carried out at an ambient air temperature of $(20 \pm 5) ^\circ\text{C}$ after the ACS has been kept at this temperature for at least 12 h.

10.2.6.2 Impact test

a) Principle

The complete ACS (with all components mounted inside and fitted on suitable supports and securing devices (see 8.101) if these form part of the ACS) shall be subjected to a series of impacts of 6 J applied to the enclosure (not to the components inside it) (see 8.1.6).

b) Method of test

The equipment to be tested shall be fixed on a support of adequate rigidity to restrict movement of the ACS to 0,1 mm under the effect of the prescribed impact. Three successive impacts shall be applied to each face of the ACS under test by means of either:

- 1) a solid smooth steel sphere approximately 50 mm in diameter and with a mass of (500 ± 25) g, which shall be allowed to fall freely from rest through a vertical height of 1,2 m onto the enclosure surface held in a horizontal plane. The hardness of the sphere shall be not less than 50 HR and not more than 58 HR, or
- 2) a similar steel sphere, shall be suspended by a cord and swing as a pendulum in order to apply a horizontal impact, falling through a vertical distance of 1,2 m.

See Figure 101 for the test setup.

Sloping surfaces can be tested using the pendulum but if this is not convenient the surface will be aligned in the horizontal plane by turning the unit on the support and the test 1) is used. Before each test an inspection of the sphere shall be made to ensure that it is free from burrs and defects.

The test shall be so arranged that the impacts are applied at positions where weaknesses are most likely to be revealed. A total of 18 impacts shall be applied to the ACS.

The test is not applicable to components such as socket-outlets, operating handles, illuminating lights, pushbuttons, actuators, etc., when these components are mounted in recesses with respect to the main surfaces, so that the distance between the most exposed parts of these components and the said surfaces is at least 1 cm.

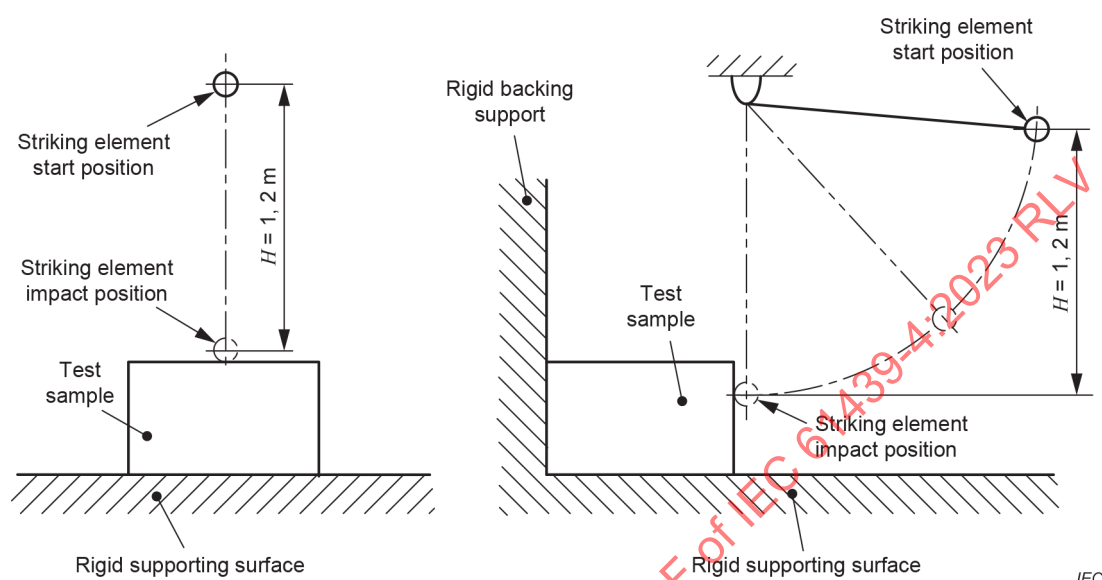


Figure 101 – Impact test using striking element

10.2.6.3 Shock test

a) Principle

The ACS shall be subjected to a single pulse half-sine wave, the shock test having a severity of 500 m/s² (50 g) peak acceleration and a duration of 11 ms.

b) Method of test

The ACS in working order shall be tested according to IEC 60068-2-27. Subject to agreement between manufacturer and user, the test can be carried out at separate SECTIONS of the ACS.

10.2.6.4 Results to be obtained

After the test, the enclosure shall continue to provide the degrees of protection specified in 8.2.2; any distortions or deformations of the enclosure and components shall neither be detrimental to the proper functioning of the ACS nor decrease creepage distances and clearances to below the required values; actuators, handles, etc., shall still be operable.

Distortion or deformation of plastic parts that can return in correct position by simple action (such as opening and reclosing of the cover) are not considered to be detrimental to the proper functioning of the ACS.

Superficial damage, paint removals, small indentations, cracks not visible with normal or corrected vision without further magnification, or surface cracks shall not constitute failure of the test.

10.9.3.1 General

Replacement of the first paragraph:

Verification shall be made by test.

10.10.1 General

Modification:

Item c) of this subclause of IEC 61439-1:2020 is not applicable.

10.10.4 Verification assessment

This subclause of IEC 61439-1:2020 is not applicable.

11 Routine verification

This clause of IEC 61439-1:2020 is applicable.

Additional clause:

101 Particular features of ACS

101.1 General requirements and functions

An ACS consists of one incoming unit and one or more outgoing units and can incorporate METERING UNIT(s) and TRANSFORMER UNIT(s).

Outgoing unit(s) can provide different functions such as: supply other ACS, lighting, machines or electric tools or other construction site equipment.

An ACS can be intended to be interconnected to form an installation or part of an installation in the form of a series of ACS. Apart from all their characteristics, they are covered by the same rules for protection against electric shock and provide, if possible, selective protection by a suitable choice, for example of breaking capacity, current setting and operating time.

These various characteristics are laid down by the manufacturer or are the subject of an agreement between manufacturer and user taking into account the nature of supply and/or distribution network and relevant installation requirements.

According to the relevant installation standards IEC 60364 series SPDs should be considered to protect against overvoltages.

101.2 Incoming unit

The cable connection facilities (terminals, connecting devices, connectors or plug and socket-outlet accessory) shall be compatible with the current rating of the ACS.

An isolating device and an over-current protective device shall be provided.

There shall be means for securing the isolating device in the open position.

However, the over-current protective device can be omitted if the ACS is adequately protected by an over-current protective device located in an upstream (supplying) ACS. In this case the assembly manufacturer shall provide the relevant information to the user for the correct choice of the upstream device.

According to IEC 60364-5-53, plug and socket-outlet arrangements can be used as isolating devices.

101.3 Metering unit

The METERING UNIT shall be designed by or in agreement with the energy suppliers if it is intended to accept metering device(s) to measure the energy consumed for the purpose of payment of energy to the said suppliers.

METERING UNITS not intended for the purpose of payment of energy to the suppliers are not necessarily designed by or in agreement with those suppliers.

101.4 Transformer unit

101.4.1 General

This unit can include a low-voltage/extra low-voltage (LV/ELV) transformer and/or low-voltage/low-voltage TRANSFORMER UNITS (LV/LV).

101.4.2 LV/ELV unit

This unit can be either of the LV/SELV or of the LV/PELV type.

The requirements of IEC 60364-4-41:2005, Clause 414 apply.

This type of unit essentially consists of:

- a) the protective and control devices in the primary circuit;
- b) the transformer, which shall be in accordance with IEC 61558-2-23;
- c) the protective and control devices for the output circuit(s).

101.4.3 LV/LV units

The requirements of IEC 60364-4-41:2005, Clause 413 apply.

Each LV/LV unit consists essentially of:

- a) the protective and control devices on the primary circuit;
- b) the LV/LV transformer, which shall be an isolating transformer in accordance with IEC 61558-2-23;
- c) the protective and control devices for the output circuit(s);
- d) the outlets, either terminals or socket-outlets. Socket-outlets shall be protected as required in 101.5 e).

Notwithstanding item b), the transformer shall not be an isolating transformer if the neutral point is connected by a cable to an earthing terminal outside the enclosure. This cable shall be identified by a label placed inside the enclosure as close as possible to the terminal. Also in this case requirements a), c) and d) apply.

101.5 Outgoing units

Each unit consists of one or several outgoing circuits:

- a) There shall be means for isolation, load switching, over-current protection and for fault protection. These functions can be provided by one or more devices.
- b) The load switching device shall be easily accessible without the use of a key or tool in normal use.

NOTE 1 This means that an ACS can have doors closed by key or tools for other purposes (e.g. closing at the end of working time) and they are opened during the normal use.

- c) The switching device shall operate simultaneously on all poles and involve all the phase conductors. For switching the neutral conductor, see IEC 60364-5-53:2019, Clause 536.
- d) The connection of the outgoing circuits can be made with socket outlets or by terminals for direct connection.
- e) Circuits supplying socket-outlets shall be provided with provisions to ensure:
 - basic protection or fault protection according to IEC 60364-7-704:2017.
Where RCD's are used, the same RCD can protect several socket-outlets. However, consideration should be given to the effects of unintended tripping e.g. when the RCD protects more than 6 socket outlet;
 - the protection against overcurrent with protective devices with a rated current not exceeding the rated current of the socket-outlet. A protective device can protect more than one socket-outlet (not applicable to IT systems).
Consideration should be given to effects of unintended tripping e.g. when an overcurrent protective device protects more than one socket outlet.

NOTE 2 Measures for unwanted tripping are given in Clause 531 of IEC 60364-5-53:2019 and IEC 60364-5-53:2019/AMD1:2020

Addition:

Table 101 – Values of assumed loading

Type of load	Assumed loading factor
Distribution – 2 and 3 circuits	0,9
Distribution – 4 and 5 circuits	0,8
Distribution – 6 to 9 circuits	0,7
Distribution – 10 or more circuits	0,6

Annexes

The annexes of IEC 61439-1:2020 are applicable except as follows:

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Annex C (informative)

User information template

Table C.1 is intended as a template for the identification of items necessary for the assembly manufacturer which is provided by the user.

It is intended to be used and developed in the relevant assembly standards.

**Table C.1 – Items subject to agreement between
the assembly manufacturer and the user**

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Electrical system				
Earthing system	5.6, 8.4.3.1, 8.4.3.2.3, 8.6.2, 10.5, 11.4	Manufacturer's standard, selected to suit local requirements	TT, TN-C / TN-C-S / IT, TN-S	
Nominal voltage (V)	3.8.9.1, 5.2.1, 8.5.3	Local, according to installation conditions	max 1 000 V AC or 1 500 V DC	
Transient overvoltages	5.2.4, 8.5.3, 9.1	Determined by the electrical system	Overvoltage category I / II / III / IV	
Temporary overvoltages	9.1	Nominal system voltage + 1 200 V	None	
Rated frequency f_n (Hz)	3.8.12, 5.5, 8.5.3, 10.10.2.3, 10.11.5.4	According to local installation conditions	DC/50 Hz/60 Hz	
Additional on-site testing requirements: wiring, operational performance and function	11.10	Manufacturer's standard, according to application	None	
Short-circuit withstand capability				
Prospective short-circuit current at supply terminals I_{cp} (kA)	3.8.7	Determined by the electrical system	None	
Prospective short-circuit current in the neutral	10.11.5.3.5	Max. 60 % of phase values	None	
Prospective short-circuit current in the protective circuit	10.11.5.6	Max. 60 % of phase values	None	
SCPD in the incoming functional unit requirement	9.3.2	According to local installation conditions	Yes / No	
Co-ordination of short-circuit protective devices including external short-circuit protective device details	9.3.4	According to local installation conditions	None	
Data associated with loads likely to contribute to the short-circuit current	9.3.2	No loads likely to make a significant contribution allowed for	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Protection of persons against electric shock in accordance with IEC 60364-4-41				
Type of protection against electric shock – Basic protection	8.4.2	Basic protection	According to local installation regulations	
Type of protection against electric shock – Fault protection	8.4.3	According to local installation conditions	Automatic disconnection of supply / Electrical separation / Total insulation	
Installation environment				
Location type	3.5, 8.1.4, 8.2	Manufacturer's standard, according to application	None	
Protection against ingress of solid foreign bodies and ingress of water	8.2.2, 8.2.3	IP 44 minimum	None	
Mechanical strength	8.1.5, 10.2.6	50 g 11 ms	None	
Protection against mechanical impact	8.2.1, 10.2.6	6 J		
Resistance to UV radiation	10.2.4	Temperate climate	None	
Resistance to corrosion	7.1, 7.2, 10.2.2	Normal service conditions and/or Special service condition	normal service conditions special service condition	
Ambient air temperature – Lower limit	7.1.1	–25 °C	None	
Ambient air temperature – Upper limit	7.1.1	40 °C	None	
Ambient air temperature – Daily average maximum	7.1.1, 9.2	35 °C	None	
Maximum relative humidity	7.1.2	100 % at 25 °C	None	
Pollution degree (of the installation environment)	7.1.2	3	3 and 4	
Altitude	7.1.1	≤ 2 000 m	None	
EMC environment (A or B)	9.4, 10.12, Annex J	A/B	A/B	
Special service conditions (e.g. vibration, exceptional condensation, strong electric or magnetic fields, fungus, small creatures, explosion hazards, heavy vibration and shocks, earthquakes)	7.2, 8.5.4, 9.3.3 Table 7	No special service conditions	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Installation method				
Transportable (semi-fixed)/mobile	3.5.101 3.5.102	Transportable (semi-fixed), mobile	Transportable (semi-fixed), mobile	
Maximum overall dimensions and weight	5.6, 6.2.1	Manufacturer's standard, according to application	None	
External conductor type(s)	8.8	Manufacturer's standard	Cable / BUSBAR Trunking System	
Direction(s) of external conductors	8.8	Manufacturer's standard	None	
External conductor material	8.8	Copper	Copper / aluminium	
External phase conductor, cross SECTIONS, and terminations	8.8	As defined within the standard	None	
External PE, N, PEN conductor's cross SECTIONS, and terminations	8.8	As defined within the standard	None	
Special terminal identification requirements	8.8	Manufacturer's standard	None	
Storage and handling				
Maximum dimensions and weight of transport units	6.2.2, 10.2.5	Manufacturer's standard	None	
Methods of transport (e.g. forklift, crane)	6.2.2, 8.1.6	Manufacturer's standard	None	
Environmental conditions different from the service conditions	7.3	As service conditions	None	
Packing details	6.2.2	Manufacturer's standard	None	
Operating arrangements				
Access to manually operated devices	8.4.6	Ordinary persons	None	
Location of manually operated devices	8.5.5	Easily accessible	None	
Isolation of load installation equipment items	8.4.2, 8.4.3.3	Manufacturer's standard	Individual / groups / all	
Maintenance and upgrade capabilities				
Requirements related to accessibility in service by ordinary persons; requirement to operate devices or change components while the ACS is energised	8.4.6.1	Basic protection	None	
Method of functional units connection	8.5.1, 8.5.2	Manufacturer's standard	None	
Provisions for basic protection with hazardous live internal parts during maintenance or upgrade (e.g. functional units, main BUSBARS, distribution BUSBARS)	8.4	No requirements for protection during maintenance or upgrade	None	

Characteristics	Reference clause or subclause	Default arrangement ^b	Options listed in standard	User requirement ^a
Current carrying capability				
Rated current of the ACS I_{nA} (A)	3.8.9.1, 5.3, 8.4.3.2.3, 8.5.3, 8.8, 10.10.2, 10.10.3, 10.11.5, Annex E	Manufacturer's standard, according to application	None	
Rated current of circuits I_{nc} (A)	5.3.2	Manufacturer's standard, according to application	None	
Rated diversity factor	5.4, 10.10.2.3, Annex E	As defined within the standard	RDF for groups of circuits / RDF for whole ACS	
Ratio of cross SECTION of the neutral conductor to phase conductors: phase conductors up to and including 16 mm ²	8.6.1	100 %	None	
Ratio of cross SECTION of the neutral conductor to phase conductors: phase conductors above 16 mm ²	8.6.1	50 % (min. 16 mm ²)	None	
^a For exceptionally onerous applications, more stringent requirements to those in the standard can apply. ^b In some cases information declared by the assembly manufacturer can take the place of an agreement.				

Annex D (informative)

Design verification

Table D.1 – List of design verifications to be performed

Replacement of table:

No.	Characteristic to be verified	Clauses or subclauses	Verification options available		
			Testing	Comparison with a reference design	Assessment
1	Strength of material and parts:	10.2			
	Resistance to corrosion	10.2.2	YES	NO	NO
	Properties of insulating materials:	10.2.3			
	Thermal stability	10.2.3.1	YES	NO	NO
	Resistance to abnormal heat and fire due to internal electric effects	10.2.3.2	YES	NO	NO
	Resistance to ultra-violet (UV) radiation	10.2.4	YES	NO	NO
	Lifting	10.2.5	YES	NO	NO
	Mechanical impact	10.2.6	YES	NO	NO
	Marking	10.2.7	YES	NO	NO
	Mechanical operation	10.2.8	YES	NO	NO
2	Degree of protection of enclosures	10.3	YES	NO	YES
3	Clearances	10.4	YES	NO	YES
4	Creepage distances	10.4	YES	NO	NO
5	Protection against electric shock and integrity of protective circuits:	10.5			
	Effective continuity between the exposed conductive parts of the ACS and the protective circuit	10.5.2	YES	NO	NO
	Short-circuit withstand strength of the protective circuit	10.5.3	YES	YES	YES
6	Incorporation of switching devices and components	10.6	NO	NO	YES
7	Internal electrical circuits and connections	10.7	NO	NO	YES
8	Terminals for external conductors	10.8	NO	NO	YES
9	Dielectric properties:	10.9			
	Power-frequency withstand voltage	10.9.2	YES	NO	NO
	Impulse withstand voltage	10.9.3	YES	NO	NO
	Enclosures made of insulating material	10.9.4	YES	NO	NO
	External operation handles of insulating material	10.9.5	YES	NO	NO
	Conductors covered by insulating material to provide protection against electric shock	10.9.6	YES	NO	NO
10	Temperature-rise limits	10.10	YES	YES	NO
11	Short-circuit withstand strength	10.11	YES	YES	NO
12	Electromagnetic compatibility (EMC)	10.12	YES	NO	YES

Annex L (informative)

Guidance on verification of temperature-rise

Modifications:

L.2 Temperature-rise limits

The first paragraph of this clause of IEC 61439-1:2020 is not applicable.

L.4 Verification assessment

This clause of IEC 61439-1:2020 is not applicable.

L.5 Verification by comparison with a reference design

This clause of IEC 61439-1:2020 is not applicable.

Figure L.1 – Verification of temperature-rise

This figure of IEC 61439-1:2020 is not applicable.

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Annex M
(normative)

**Verification of the short-circuit withstand strength of BUSBAR structures
by comparison with a reference design by calculation**

This annex of IEC 61439-1:2020 is not applicable.

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Annex N (informative)

List of notes concerning certain countries

Subclause	Text
6.1	Add the following note after the last paragraph: NOTE In Norway, assemblies are additionally marked with the minimum ambient temperature applicable for the ACS.
7.1.1	Add the following note after the last paragraph: NOTE In Norway, assemblies suitable for normal operation at a lower ambient temperature than -25 °C also comply with the requirements of this publication.
8.2.2	Add the following note after the first paragraph: NOTE 1 In the United States of America (USA), Canada and in Mexico enclosure “type” designations are used to specify “the degree of protection” provided to the ACS. For applications in the USA, the appropriate enclosure type designation should be used as specified in NEMA 250. For applications in Canada, the appropriate enclosure type designation should be used as specified in CSA standard C22.2 No. 94.1 and 94.2. For applications in Mexico, the appropriate enclosure Type designation should be used as specified in NMX-J-235/1-ANCE and NMX-J-235/2-ANCE. Add the following note after the third paragraph of this subclause: NOTE 2 In Spain wiring rules (RD 842/2002) require a minimum degree of protection of IP 45 for enclosures, switchgear and controlgear, socket-outlets and other installation elements intended for outdoor construction sites.
8.8	Add the following note after the last paragraph: NOTE In Australia and New Zealand socket outlets for industrial use with lower current are used.
10.2.6.1	Add the following notes at the end of this subclause: NOTE 1 In Sweden National codes and regulations require a minimum operating temperature of -25 °C. NOTE 2 In Norway, the test is carried out at an ambient temperature (20±5) °C immediately after the assembly has been kept at a temperature corresponding to the minimum ambient temperature specified for the ACS, for a period of not less than 12 h.

Bibliography

The bibliography of IEC 61439-1:2020 is applicable except as follows.

Addition:

IEC 60309-1, *Plugs, fixed or portable socket-outlets and appliances inlets for industrial purposes – Part 1: General requirements*

IEC 60309-2, *Plugs, fixed or portable socket-outlets and appliance inlets for industrial purposes – Part 2: Dimensional compatibility requirements for pin and contact-tube accessories*

IEC 60364 (all parts), *Electrical installations of buildings*

IEC 60364-5-53:2019, *Low-voltage electrical installations – Part 5-53: Selection and erection of electrical equipment – Devices for protection for safety, isolation, switching, control and monitoring*

IEC 60364-5-53:2019/AMD1:2020

IEC 61140:2016, *Protection against electric shock – Common aspects for installation and equipment*

IEC TR 61200-704:1996, *Electrical installation guide – Part 704: Construction and demolition site installations*¹

IEC TR 61439-0, *Low-voltage switchgear and controlgear assemblies – Part 0: Guidance to specifying assemblies*

¹ This publication was withdrawn.

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

ENSEMBLES D'APPAREILLAGE À BASSE TENSION –

Partie 4: Exigences particulières pour ensembles de chantiers (EC)

AVANT-PROPOS

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L'IEC 61439-4 a été établie par le sous-comité 121B: Ensembles d'appareillages à basse tension, du comité d'études 121 de l'IEC: Appareillages et ensembles d'appareillages basse tension. Il s'agit d'une Norme internationale.

Cette deuxième édition de l'IEC 61439-4 annule et remplace la première édition parue en 2012. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) alignement sur l'IEC 61439-1:2020 en ce qui concerne la structure et le contenu technique, selon le cas.

Le texte de ce document est issu des documents suivants:

Projet	Rapport de vote
121B/183/FDIS	121B/188/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à son approbation.

La langue employée pour l'élaboration de cette Norme internationale est l'anglais.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2, il a été développé selon les Directives ISO/IEC, Partie 1 et les Directives ISO/IEC, Supplément IEC, disponibles sous www.iec.ch/members_experts/refdocs. Les principaux types de documents développés par l'IEC sont décrits plus en détail sous www.iec.ch/publications.

Le présent document doit être lu conjointement avec l'IEC 61439-1:2020. Les dispositions des règles générales traitées dans l'IEC 61439-1:2020 s'appliquent uniquement au présent document dans la mesure où elles sont spécifiquement citées. Lorsque le présent document mentionne "addition", "modification" ou "remplacement", le texte correspondant de l'IEC 61439-1:2020 doit être adapté en conséquence.

Les paragraphes qui sont numérotés avec un suffixe 101 (102, 103, etc.) sont ajoutés au même paragraphe de l'IEC 61439-1:2020.

Les nouveaux tableaux et figures du présent document sont numérotés à partir de 101.

Les nouvelles annexes du présent document sont désignées AA, BB, etc.

Dans le présent document, les termes écrits en petites majuscules sont définis à l'Article 3.

L'attention du lecteur est attirée sur le fait que l'Annexe N énumère tous les articles qui traitent des différences à caractère moins permanent inhérentes à certains pays, concernant le sujet du présent document.

Une liste de toutes les parties de la série IEC 61439, publiées sous le titre général *Ensembles d'appareillage à basse tension*, se trouve sur le site web de l'IEC.

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ENSEMBLES D'APPAREILLAGE À BASSE TENSION –

Partie 4: Exigences particulières pour ensembles de chantiers (EC)

1 Domaine d'application

NOTE Dans le présent document, l'abréviation EC (ensemble de chantier, voir 3.1.101) désigne un ensemble d'appareillage à basse tension destiné à être utilisé sur des chantiers ou sites similaires.

Le présent document définit les exigences particulières des EC comme suit:

- ensembles dont la tension assignée ne dépasse pas 1 000 V en courant alternatif ou 1 500 V en courant continu;
- ensembles dont les valeurs nominales des tensions primaire et secondaire des transformateurs incorporés dans les EC se situent dans les limites spécifiées ci-dessus;
- ensembles destinés à être utilisés sur des chantiers, à l'intérieur comme à l'extérieur, c'est-à-dire des lieux de travail temporaires qui ne sont généralement pas accessibles au public et où sont exécutés des travaux de construction, d'installation, de réparation, de modification ou de démolition d'immeubles (bâtiments) ou d'ouvrage de génie civil (travaux publics) ou encore des travaux de terrassement ou tout autre travail analogue;
- ensembles de type transportable (semi-fixe) ou MOBILE avec enveloppe.

La fabrication et/ou l'assemblage peuvent être réalisés par une entité qui n'est pas le constructeur d'origine (voir 3.10.1 de l'IEC 61439-1:2020).

Le présent document ne s'applique pas aux appareils individuels et aux composants indépendants, tels que les démarreurs de moteurs, fusibles-interrupteurs, matériels électroniques, etc. qui sont conformes aux normes de produit applicables.

Le présent document ne s'applique pas aux ensembles destinés à être utilisés dans les locaux de service des chantiers (bureaux, vestiaires, salles de réunion, cantines, restaurants, dortoirs, locaux sanitaires, etc.).

Les exigences de protection électrique fournies par l'équipement fabriqué selon le présent document sont données dans l'IEC 60364-7-704.

2 Références normatives

L'article de l'IEC 61439-1:2020 s'applique, avec les exceptions suivantes:

Addition:

IEC 60068-2-27, *Essais d'environnement – Partie 2-27: Essais – Essai Ea et guide: Chocs*

IEC 60068-2-42, *Essais d'environnement – Partie 2-42: Essais – Essai Kc: Essai à l'anhydride sulfureux pour contacts et connexions*

IEC 60364-7-704:2017, *Installations électriques à basse tension – Partie 7-704: Exigences pour les installations ou emplacements spéciaux – Installations de chantiers de construction et de démolition*

IEC 61439-1:2020, *Ensembles d'appareillage à basse tension – Partie 1: Règles générales*

IEC 61558-2-23, *Sécurité des transformateurs, bobines d'inductance, blocs d'alimentation et des combinaisons de ces éléments – Partie 2-23: Règles particulières et essais pour les transformateurs et les blocs d'alimentation pour chantiers*

3 Termes et définitions

L'article de l'IEC 61439-1:2020 s'applique, avec les exceptions suivantes:

Termes et définitions supplémentaires:

3.1 Termes généraux

3.1.101

ensemble d'appareillage à basse tension utilisé sur les chantiers

EC

combinaison d'un ou de plusieurs appareils de transformation ou de connexion basse tension avec équipements associés de commande, de mesure, de signalisation, de protection et de régulation complètement assemblés avec toutes leurs liaisons internes électriques et mécaniques et leurs éléments de construction, conçue et construite pour être utilisée sur tous les chantiers, à l'intérieur et à l'extérieur

3.2 Unités de construction des ensembles

3.2.101

unité de comptage

unité fonctionnelle équipée d'appareils de comptage de l'énergie électrique

3.2.102

unité de transformation

unité fonctionnelle constituée principalement d'un ou de plusieurs transformateurs

Modifications:

3.3 Présentation extérieure des ensembles

3.3.1

ensemble ouvert

Le terme de l'IEC 61439-1:2020 ne s'applique pas.

3.3.2

ensemble ouvert à protection frontale

Le terme de l'IEC 61439-1:2020 ne s'applique pas.

Remplacement:

3.3.3

EC sous enveloppe

EC dont toutes les faces sont fermées, sauf éventuellement la surface de montage, de façon à procurer un degré de protection défini

3.3.7**EC en coffret**

EC SOUS ENVELOPPE prévu:

- soit pour être fixé sur une paroi verticale;
- soit pour reposer sur une surface horizontale par l'intermédiaire de pieds ou jambes (articulés ou non) ou d'une charpente non incorporée dans l'EC (voir 3.4.2 de l'IEC 61439-1:2020).

Modification:

3.5 Conditions d'installation des ensembles**3.5.1****ensemble pour installation à l'intérieur**

Le terme de l'IEC 61439-1:2020 ne s'applique pas (voir 3.1.101).

3.5.2**ensemble pour installation à l'extérieur**

Le terme de l'IEC 61439-1:2020 ne s'applique pas (voir 3.1.101).

3.5.3**ensemble fixe**

Le terme de l'IEC 61439-1:2020 ne s'applique pas.

3.5.4**ensemble mobile**

Le terme de l'IEC 61439-1:2020 ne s'applique pas.

Termes et définitions supplémentaires:

3.5.101**EC transportable****EC semi-fixe**

EC prévu pour être utilisé à un emplacement donné auquel il n'est pas fixé définitivement

Note 1 à l'article: L'emplacement d'un EC TRANSPORTABLE peut varier au cours d'un même chantier. Lorsque l'équipement est déplacé à un autre endroit, il est en premier lieu déconnecté de l'alimentation.

3.5.102**EC mobile**

EC qui peut être déplacé au fur et à mesure de l'avancement du chantier, sans le mettre hors tension

Termes et définitions supplémentaires:

3.101 Fonction des EC**3.101.1****fonction de raccordement**

aptitude pour un EC à être connecté soit au réseau d'alimentation électrique public, soit au poste de transformation, soit au générateur propre au chantier

3.101.2**fonction de comptage**

aptitude au comptage de l'énergie électrique consommée sur le chantier

3.101.3

fonction de distribution

aptitude à fournir la distribution et la protection de l'alimentation électrique sur le chantier au moyen de bornes de raccordement ou de socles de prises de courant

3.101.4

fonction de transformation

aptitude à fournir des moyens de transformation des tensions ou à fournir des mesures de protection électrique

Note 1 à l'article: Les détails concernant leurs exigences sont donnés en 101.1.

4 Symboles et abréviations

L'article de l'IEC 61439-1:2020 s'applique.

5 Caractéristiques d'interface

L'article de l'IEC 61439-1:2020 s'applique, avec les exceptions suivantes.

5.3.1 Courant assigné d'un ensemble (I_{nA})

Remplacement du titre et du texte:

5.3.1 Courant assigné d'un EC- (I_{nA})

Le courant assigné d'un EC est le **courant assigné du groupe I_{ng}** de son circuit d'arrivée.

Ce courant doit circuler sans que l'échauffement des différentes parties ne dépasse les limites spécifiées en 9.2 de l'IEC 61439-1:2020.

5.4 Facteur de diversité assigné (RDF)

Addition:

La charge présumée des circuits de départ de l'EC ou du groupe de circuits de départ doit être spécifiée par le constructeur de l'ensemble, et peut être fondée sur les valeurs données dans le Tableau 101.

Lorsque le constructeur ne spécifie aucun RDF, les valeurs du Tableau 101 s'appliquent.

5.6 Autres caractéristiques

Remplacement:

Les caractéristiques suivantes doivent être fixées:

- a) la ou les fonctions assignées par le constructeur (voir 3.101);
- b) la conception extérieure (voir 3.3);
- c) la fonction de déplacement (voir 3.5.101 et 3.5.102);
- d) le degré de protection (voir 8.2);
- e) le type de construction, par exemple, fixe ou à parties amovibles (voir 8.5.1 et 8.5.2);
- f) la protection contre les chocs électriques (voir 8.4);
- g) la résistance à la corrosion (voir 10.2.2.101);

- h) les conditions spéciales d'emploi, le cas échéant (voir 7.2);
- i) la classification de compatibilité électromagnétique (CEM) (voir Annexe J de l'IEC 61439-1:2020).

6 Informations

L'article de l'IEC 61439-1:2020 s'applique, avec les exceptions suivantes.

6.1 Marquage pour l'identification des ensembles

Remplacement du titre et du texte:

6.1 Marquage pour l'identification des EC

Le constructeur d'ensembles doit fournir chaque EC avec une ou plusieurs étiquettes, marquées d'une manière durable et disposées à un emplacement qui leur permet d'être visibles et lisibles lorsque l'EC est installé et en fonctionnement.

La conformité est vérifiée selon l'essai du 10.2.7 et par examen.

Les renseignements suivants concernant l'EC doivent être fournis sur l'étiquette ou les étiquettes:

- a) le nom du constructeur d'ensembles ou sa marque de fabrique (voir 3.10.2);
- b) la désignation du type ou un numéro d'identification, ou tout autre moyen d'identification, qui permet d'obtenir du constructeur d'ensembles les renseignements appropriés;
- c) les moyens d'identification de la date de fabrication;
- d) IEC 61439-4;
- e) la nature du courant (et la fréquence en cas de courant alternatif);
- f) la tension assignée (U_n) (de l'EC) (voir 5.2.1);
- g) le courant assigné de l'EC (I_{na}) (voir 5.3.1);
- h) le degré de protection (voir 8.2);
- i) la masse si celle-ci dépasse 30 kg.

Si le nom ou la marque de fabrique du constructeur est indiqué sur l'EC, il ne doit pas être indiqué sur la plaque signalétique.

6.2.1 Renseignements concernant l'ensemble

Remplacement du titre et du texte:

6.2.1 Renseignements concernant l'EC

Les renseignements complémentaires suivants doivent, le cas échéant, être fournis dans la documentation technique du constructeur d'ensembles, livrée avec l'EC:

- a) la tension assignée d'emploi (U_e) (d'un circuit) (voir 5.2.2);
- b) la tension assignée de tenue aux chocs (U_{imp}) (voir 5.2.4);
- c) la tension assignée d'isolement (U_i) (voir 5.2.3);
- d) le courant assigné de chaque circuit (I_{nc}) (voir 5.3.2);
- e) la valeur de crête du courant assigné admissible (I_{pk}) (voir 5.3.4);
- f) le courant assigné de courte durée admissible (I_{cw}) avec sa durée (voir 5.3.4);

- g) le courant assigné de court-circuit conditionnel (I_{cc}) (voir 5.3.5);
- h) la fréquence assignée (f_n) (voir 5.5);
- i) le ou les facteurs de diversité assignés (RDF) (voir 5.4);
- j) les fonctions (voir 3.101);
- k) tous les renseignements nécessaires concernant les autres classifications et caractéristiques fixées (voir 5.6);
- l) la tenue aux courts-circuits et les caractéristiques du ou des dispositifs de protection contre les courts-circuits (voir 9.3.2);
- m) les dimensions hors tout (y compris les saillies, par exemple poignées, couvercles, portes).

6.2.2 Instructions de manutention, d'installation, d'exploitation et de maintenance

Addition:

Il convient que le constructeur d'un EC spécifie, dans la documentation technique jointe à l'EC, les autres types d'ensembles qui peuvent y être raccordés. Il convient que cette documentation indique si la compatibilité est établie avec le type de système de mise à la terre employé et/ou nécessite une coordination de la protection électrique dans l'installation complète.

Il convient que le constructeur fournisse la documentation appropriée afin de maintenir les mesures de protection et la coordination des appareils de protection dans l'installation complète.

7 Conditions d'emploi

L'article de l'IEC 61439-1:2020 s'applique, avec les exceptions suivantes.

Modifications:

7.1.2 Degré de pollution

Remplacement du dernier alinéa par ce qui suit:

Seuls les degrés de pollution 3 et 4 s'appliquent.

Le microenvironnement peut être réduit au degré de pollution 2 si l'enveloppe procure au moins le degré de protection IP5X et en veillant à éviter la condensation.

7.2 Conditions spéciales d'emploi

Addition du nouveau point suivant:

- n) atmosphère fortement polluée.

8 Exigences de construction

L'article de l'IEC 61439-1:2020 s'applique, avec les exceptions suivantes.

8.1.1 Généralités

Addition:

Tout l'appareillage doit être disposé à l'intérieur d'une enveloppe équipée des panneaux amovibles, plaques de fermeture ou portes, selon le cas, pour le branchement ou la maintenance, avec possibilité d'exception pour les appareils mentionnés en 8.101 à condition qu'ils résistent aux conditions d'emploi de l'Article 7 et satisfassent aux exigences du 8.1.2 et du 8.1.6.

8.1.2 Protection contre la corrosion

Remplacement:

La protection contre la corrosion doit être assurée par l'utilisation de matériaux appropriés ou par des revêtements de protection sur la surface exposée, en tenant compte des conditions normales d'emploi (voir 7.1) et/ou des conditions spéciales d'emploi (voir 7.2). La conformité à cette exigence est vérifiée par l'essai du 10.2.2.

8.1.4 Résistance aux rayonnements ultraviolets (UV)

Remplacement:

Pour les enveloppes et parties externes en matériaux isolants, la résistance aux rayonnements ultraviolets doit être vérifiée conformément au 10.2.4.

Pour les parties externes en matériaux isolants des composants couverts par une autre norme IEC (par exemple, socles de prises de courant, poignées de manœuvre, boutons-poussoirs, etc.), cet essai n'est pas exigé.

8.1.5 Résistance mécanique

Addition:

Les EC doivent être construits de manière à résister à des chocs mécaniques qui présentent une accélération de 500 m/s^2 et une forme d'impulsion demi-sinusoïdale d'une durée de 11 ms (qui correspondent à un matériel transporté sans arrimage dans des véhicules routiers ou ferroviaires normaux, pendant de longues périodes).

La conformité est vérifiée selon le 10.2.6.

8.1.6 Dispositifs de levage

Remplacement:

Des anneaux de levage et/ou des poignées de préhension (ou tout autre système équivalent) doivent être prévus sur l'EC et être solidaires de l'enveloppe ou du châssis support.

La conformité est vérifiée selon l'essai du 10.2.5.