IEC 61439-4

Edition 1.0 2012-11

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)

IEC 61439-4:2012

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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LOW-VOLTAGE SWITCHGEAR AND CONTROLGEAR ASSEMBLIES –

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

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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International Standard IEC 61439-4 has been prepared by subcommittee 17D: Low-voltage switchgear and controlgear assemblies, of IEC technical committee 17: Switchgear and controlgear.

This first edition of IEC 61439-4 cancels and replaces the second edition of IEC 60439-4 (2004), and constitutes a technical revision.

This edition includes the following significant technical changes with respect to the last edition of IEC 60439-4:

- modification of the title as "Part 4: Particular requirements for assemblies for construction sites (ACS)"
- alignment on IEC 61439-1 regarding the structure and technical content, as applicable;
- to allow comparison with tested ACS.

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

FDIS	Report on voting
17D/460/FDIS	17D/469/RVD

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This standard is to be read in conjunction with IEC 61439-1. The provisions of the general rules dealt with in IEC 61439-1 (hereinafter referred to as Part 1) are only applicable to this standard insofar as they are specifically cited. When this standard states “addition”, “modification” or “replacement”, the relevant text in Part 1 is to be adapted accordingly.

Subclauses that are numbered with a 101 (102, 103, etc.) suffix are additional to the same subclause in Part 1.

Tables and figures in this Part 4 that are new are numbered starting with 101.

New annexes in this Part 4 are lettered AA, BB, etc.

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

The reader’s attention is drawn to the fact that Annex AA lists all of the “in-some-country” clauses on differing practices of a less permanent nature relating to the subject of this standard.

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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication 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 standard, 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 part of 61439 defines the specific requirements of ACS as follows:

– ASSEMBLIES for which the rated voltage does not exceed 1 000 V in case of a.c. or 1 500 V in case of d.c.;

– 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 be carried out other than by the original manufacturer.

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

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

2 Normative references

This clause of Part 1 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, *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 61439-1:2011, *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 Part 1 is applicable except as follows:

Additional terms:

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 Part 1 does not apply.

3.3.2
dead-front ASSEMBLY

This term of Part 1 does not apply.

Replacements:

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 Part 1)

Modifications:

3.5 Conditions of installation of ASSEMBLIES

3.5.1
ASSEMBLY for indoor installation

This term of Part 1 does not apply (see 3.1.101).

3.5.2
ASSEMBLY for outdoor installation

This term of Part 1 does not apply (see 3.1.101).

3.5.3
stationary ASSEMBLY

This term of Part 1 does not apply.

3.5.4
movable ASSEMBLY

This term of Part 1 does not apply.

Additional terms:

3.5.101
transportable ACS
semi-fixed ACS
ACS intended for use in a place where it is not permanently fixed; its location may vary during work on the same site. When the equipment is to be 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:

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 Part 1 is applicable.

5 Interface characteristics

This clause of Part 1 is applicable except as follows.

5.3.1 Rated current of the 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 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 Part 1.

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 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 Part 1).

6 Information

This clause of Part 1 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 a.c.);
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 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 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 Part 1 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.

7.1.3 Pollution degree

Replacement of the last paragraph with:

Only pollution degrees 3 and 4 are applicable.

The micro environment may 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) heavily polluted atmosphere.

8 Constructional requirements

This clause of Part 1 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 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 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

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.

8.2.2 Protection against contact with live parts, ingress of solid foreign bodies and water

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 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.

8.4.4 Protection by total insulation

e) This item of Part 1 is not applicable.

8.4.6.2 Requirements related to accessibility in service by authorized persons

This subclause of Part 1 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 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 60364-7-704:2005).

8.8 Terminals for external conductors

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 be connected to the ACS.

Compliance is checked by inspection.

9 Performance requirements

This clause of Part 1 is applicable except as follows.

9.3.2 Information concerning short-circuit withstand strength

The last two paragraphs of this subclause of Part 1 are not applicable.

10 Design verification

This clause of Part 1 is applicable except as follows.